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AUTHOR Izumi, Lance T.
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ABSTRACT

This study examines what makes a high quality teacher, analyzing educators' choices of teaching methodology (teacher-centered or student-centered) and what methods are favored by the California State University (CSU) schools of education. Part 1, "Teaching Methods and the Research Evidence," describes various competing teaching methodologies and examines the research evidence regarding which methods are most effective in raising student performance. Part 2, "Teaching Methods and the California State University Schools of Education," considers this research in analyzing the teacher education curriculum at various schools of education in the CSU system. Part 3, "Models for Reform: Singapore, Kumon, and Nancy Ichinaga," analyzes teaching methods used in Singapore, whose students rank at the top of international comparisons, and Kumon, the most popular after-school program in the world. Part 4, "How To Improve Teacher Training," provides recommendations to make teacher education more results-oriented and focused on improving measurable student skills and knowledge. (SM)

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# Facing the Classroom Challenge

## Teacher Quality and Teacher Training in California's Schools of Education

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By Lance T. Izumi with K. Gwynne Coburn

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# Facing the Classroom Challenge

## Teacher Quality and Teacher Training in California's Schools of Education

By
Lance T. Izumi
with K. Gwynne Coburn

Pacific Research Institute for Public Policy
San Francisco, California

April, 2001

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# Executive Summary

Research has shown that high student achievement is most strongly linked to high quality teachers. The question, though, is what makes a high quality teacher? Analyzing educators' choice of teaching methodology is critical to answering this question. Do teachers use teacher-centered methods, where teachers transmit knowledge and information to their students, or do they use student-centered methods, where teachers act as facilitators so that students can discover knowledge for themselves? What does the empirical evidence show as to which method more effectively improves student achievement? What methods are favored by the California State University (CSU) schools of education? This study answers these and other questions and makes recommendations as to what are the best courses of action for improving teacher training and teacher quality.

## Teaching Methods

Student-centered methods, espoused by education theorists such as John Dewey, Jean Piaget, and L.S. Vygotsky, form the basis of progressive education philosophy. Children are viewed as having natural curiosity and an innate desire to learn, and, thus, should be given the opportunity to acquire knowledge on their own with limited interference and direction from the teacher. In contrast, teacher-centered methods are favored by traditionalists and are based on the view that children learn from those who possess a greater knowledge base, especially their teacher.

Some of the major student-centered concepts include:

- Constructivism. This is based on the premise that students construct their own knowledge rather than having that knowledge imparted to them by teachers.
- Discovery Learning. Children can only learn and understand if they discover information for themselves. Teachers are supposed to facilitate this discovery process.
- Thematic Learning. Students use themes to study subjects and issues in-depth. Students are to explore and answer their own questions.
- Cooperative Learning. Students do classwork in teams or groups. Students teach each other and teachers are to facilitate student interaction.
- Critical-Thinking Skills. Rather than simply digesting facts, students must actively apply knowledge, solve problems, and develop conceptual understanding.

## Which Teaching Methods Work Best?

The experimental research evidence overwhelmingly shows that teacher-centered methods are more effective in improving student achievement. Excerpts of the research literature include:

- Jere Brophy of Michigan State University and Thomas Good of the University of Missouri examined dozens of methodologically rigorous studies and concluded that "students learn more efficiently when their teachers first structure new information for them and help them relate it to what they already know, and then monitor their performance and provide corrective feedback during recitation, drill, practice, or application activities."
- Brophy and Good also say that "Students achieve more when they spend most of their time being taught or supervised by their teachers rather than working on their own (or not working at all)."
- Carnegie Mellon University researchers support teacher-directed instruction based on practice and review: "All evidence, from the laboratory and from extensive case studies of professionals, indicates that real competence only comes with extensive practice."
- University of Illinois researchers conclude that "students taught with a structured curricula generally do better than those taught with either more individualized or discovery-learning approaches."
- According to famed Harvard researcher Jeanne Chall, "the traditional teacher-centered approach generally produced higher academic achievement than the progressive student-centered approach."
- Also, Chall found that "the evidence on the superiority of structured, teacher-centered methods for low-socioeconomic-status children is so consistent over the years that it would be difficult to reject."

## CSU Schools of Education

Despite the evidence showing student-centered methods to be less effective than teacher-centered methods, many CSU schools of education are biased in favor of student-centered methodology.

- CSU Dominguez Hills says that "Constructivist/cognitive approaches to teaching and learning inform our practice."
- CSU Los Angeles says that its graduate education program "is based on a constructivist perspective of learning."
- San Francisco State says that "While a diversity of theories and applications are presented, the underlying thrust … is to promote a learner-centered perspective."

The required reading at CSU schools of education also underscores the student-centered bias.

- A required text at CSU Dominguez Hills advocates less student "sitting, listening, receiving, and absorbing information" and more "active learning in the classroom, with all the attendant noise and movement of students doing, talking, and collaborating."
- Another required text at CSU Dominguez Hills belittles parents because of "their identification with traditional methods as opposed to experimental ones in which their children serve as 'guinea pigs' and their obsession with the fear that their children will turn out backwards."
- A multicultural text at CSU Dominguez Hills says that "we cannot afford to become so bogged down in grammar and spelling that we forget the whole story," which includes "racism, sexism, and the greed for money and human labor that disguises itself as 'globalization.'"
- A math text at San Francisco State says that "There is no place for requiring students to practice tedious calculations that are more efficiently and accurately done by using calculators."
- Another required text at San Francisco State says that for new teachers, "Content knowledge is not seen to be as important as possessing teaching skills and knowledge about the students being taught."
- A required text at CSU Fresno says: "Constructivist learning necessitates that students are perceived as active partners in framing the learning process ... No longer can teachers expect to be fountains of wisdom and convey knowledge to passive students."

## Alternative Approaches

Although CSU schools of education would have one believe that all enlightened people favor student-centered methods, the truth is that countries with high-achieving students employ teacher-centered methods. For example, the math curriculum of top-ranked Singapore requires:

- Students to memorize number facts in addition, multiplication, and the like.
- Students to practice calculations.
- Teachers to correct immediately students' wrong answers.
- Teachers to teach, lead, and guide their students.

The popular Japanese afterschool program, Kumon, is based on traditional teacher-centered methods, including:

- Repeated practice. Reams of worksheets with practice exercises form the basis of Kumon's math instructional program.
- Incrementalism. The Kumon curriculum is organized in an incremental step-by-step fashion.
- Mastery. Kumon emphasizes speed and accuracy, with constant assessment.

## Recommendations

While it is true that teacher-centered methods are more effective than student-centered methods in raising student achievement, it would be unwise, for various reasons, to try and mandate that CSU schools of education focus on teacher-centered methods. It would be better, instead, to create incentives for schools of education to change their focus. Recommendations include:

- Public reporting of student test scores by classroom.
- Teacher sanctions and rewards based on classroom test scores.
- District implementation of rigorous teacher-centered curricula that stress basic knowledge and skills.
- Vigorous classroom implementation of California's rigorous academic-content standards.
- School-choice scholarships for students, either through a universal or targeted program.

# Introduction

In order to improve student performance in public schools, California has adopted a variety of K–12 education reforms over the past several years, including reduced class size, various student assessment devices, school accountability systems, academic content standards, increased education spending, more charter schools, and peer review of teachers. Some of these reforms are having a positive effect on improving student achievement, others seem to have had only marginal impact on achievement, while still others need more time to demonstrate effects one way or the other. The difficulty with all these reforms, however, is that they fail to address one of the fundamental roots of the student achievement problem—the teaching methodologies taught to prospective teachers in the state's schools of education.

Researchers have shown that teacher quality is one of the factors most highly correlated to student performance. Yet, the definition of what constitutes a good or a bad teacher remains elusive. For instance, the debate over teacher quality has often veered into dead-end discussions of teacher credentials and national certifications, both of which, according to recent research, are weak indicators of teacher quality. Also, although enthusiasm, commitment, and love of children are, no doubt, important characteristics of a good teacher, their subjectivity makes their measurement difficult. The methods teachers use to educate students, however, do have a measurable impact on student performance.

Which teaching methods teachers decide to use, therefore, often determine whether a teacher is successful or not, at least based upon how well students perform on achievement tests. And since a teacher's choice of teaching method is significantly influenced by the instruction he or she receives in college teacher-education courses, it makes sense to ask if the poor performance of California's students is linked to the teaching methods absorbed during training. This study explores the issue in four parts.

Which teaching methods teachers decide to use, therefore, often determine whether a teacher is successful or not, at least based upon how well students perform on achievement tests.

Part One describes various competing teaching methodologies and examines the research evidence regarding which methods are most effective in raising student performance. Part Two considers this research in analyzing the teacher education curriculum at various schools of education in the California State University (CSU) system. Although the University of California and private universities train many teachers for

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K–12 schools, the majority of teachers in California receives its training in the CSU system. In 1997–98, out of 19,158 total multiple-subject, single-subject, and special-education credentials awarded to teachers, 10,742 were issued to teachers who trained at CSU institutions.

Part Three analyzes the teaching methods of Singapore, whose students rank at the top on international comparisons, and Kumon, the most popular afterschool program in the world. Finally, Part Four provides recommendations to make teacher education more results oriented and focused on improving measurable student skills and knowledge.

# Part 1 — Teaching Methods and the Research Evidence

## The Great Methodological Divide

Although discussions of teaching methodologies can get arcane, especially when touching on issues of educational psychology, the great divide can be easily grasped by the average layperson. On one side are the "traditionalists" who favor a basic-skills-and-knowledge type of teaching. On the other are the "progressives" who de-emphasize these areas in favor of student self-exploration and self-esteem. Education researchers, however, often prefer to use the terms "teacher-centered" and "student-centered" to describe the two opposing styles of teaching. The late Jeanne Chall, an education professor at Harvard University and one of the nation's leading authorities on reading acquisition, favored the "teacher-centered" and "student-centered" dichotomy saying that "most educational practices tend to fall into one or the other instructional category."[1]

According to Chall, student-centered methods have a number of common characteristics:

> A student-centered approach tends to view learning as good in and of itself and as a source of pleasure. If learning is not controlled too much by teachers, schools and parents, it will come naturally to the learner. Student-centered schools, therefore, emphasize joyfulness, rely on the child's natural desire to learn, and emphasize his or her individual needs and interests.... In the ideal student-centered school, the teacher remains in the background, the child's learning mainly arising from natural curiosity and desire to learn. If the teacher teaches too much, that is, too directly, it may inhibit the learner, diminishing curiosity and deflating creativity. The teacher is advised to be a facilitator, a leader, or a coach—as opposed to one who talks at length in front of the whole room.[2]

Chall says that teacher-centered methods also have numerous common traits:

> In teacher-centered education, by way of contrast, learning is seen as the responsibility of not just the student but also of the teacher. Students are conceived of as being neither good nor bad. Through education, training, and discipline,

On one side are the "traditionalists" who favor a basic-skills-and-knowledge type of teaching. On the other are the "progressives" who de-emphasize these areas in favor of student self-exploration and self-esteem.



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> students acquire the knowledge, values, and skills that will guide their thoughts and actions in adult life. In teacher-centered approaches to educational instruction, facilitating in and of itself is not enough, and interest alone cannot be relied upon. We learn, according to this view, from those who already know and from the accumulated knowledge of the culture. Not all learning is joyful: to become educated one must be able to deal with the dull but necessary along with the exciting and interesting.[3]

Chall notes that with its emphasis on student knowledge and skill, teacher-centered learning is the classic view of education and was the pattern of most American schools in the 19th century and part of the 20th, and it still characterizes instruction at prestigious American private schools, Catholic schools, and European and Asian schools.[4]

Student-centered methods question the appropriateness of content standards since they require all students to have certain knowledge and skill levels and do not recognize the individual differences between students.

These contrasts in approach result in stark differences in the delivery of instruction and educational services to students. Under student-centered methods, since learning is based on students' interests and needs, theoretically there is no need for structured subject matter or a core curriculum that is arranged hierarchically. These methods emphasize the process of learning itself, the mixing together and integration of a variety of subjects to make them more interesting for students, and problem solving as a way to teach students how to think rather than as a means to arrive at a correct answer.[5]

Teacher-centered methods, on the other hand, usually require a core curriculum based on traditional subjects such as reading, writing, literature, mathematics, science, social studies, and art, usually taught separately and arranged hierarchically in increasing levels of difficulty. Students are expected to learn basic skills and content subjects, and while individual differences in ability are recognized, students are expected to attain at least a minimal level of skill and knowledge. Thinking and problem solving are to be learned with content.[6]

The two approaches also have differing views of today's education world of content standards and standardized tests. Student-centered methods question the appropriateness of content standards since they require all students to have certain knowledge and skill levels and do not recognize the individual differences between students. Also, these methods usually oppose standardized tests that require students to know set answers to subject-matter questions, preferring qualitative tests that include open-ended questions that allow students to show their thinking process.[7]

Teacher-centered methods are usually based on formal or informal content standards and tests, including standardized tests. Such tests are viewed as important ways to measure students' mastery of subject matter.[8]

University schools of education, such as the CSU programs that will be discussed later in this paper, acknowledge these two different types of teaching methodologies, but are much more likely to support student-centered methodologies by focusing their curricula on the theories espoused by the pioneers of student-centered methods.

Indeed, as will be seen, a number of CSU schools of education explicitly state that these icons of student-centered methodologies are the guiding lights of their teacher-training programs.

## John Dewey

Chief among these student-centered icons is John Dewey, the American philosopher and educator, whose early 20th-century writings on classroom instruction and curricula remain highly influential in academia and throughout the education profession. While not an advocate of unrestrained student-centered methods, Dewey, despite supporting some teacher direction and the need to expose students to concrete subject matter, is best remembered for his view that children are natural learners whose innate curiosity can form the basis of learning experiences.

Whereas traditional teacher-centered methodology "imposes adult standards, subject matter, and methods upon those who are only growing slowly toward maturity," Dewey believed that, "The fundamental necessity [is] leading the child to realize a problem as his own, so that he is self-induced to attend [to it] in order to find out its answer."[9] In other words, learning is achieved most effectively not by teachers and textbooks pouring information into the docile brains of students, but by asking students to use their thinking process, curiosity, and experience to solve challenging problems.

This learning prescription sounds reasonable, at least at first, and most experts, including supporters of more teacher-centered practices, do not deny the importance of problem solving. The question is whether problem solving should be the overwhelming predominant focus of teaching. Williamson Evers, education research fellow at Stanford University's Hoover Institution, notes that Dewey's ideas carry an appeal and plausibility because most people recognize that not everything in their lives comes through books, and that we learn by doing. Where Dewey and his followers went wrong, says Evers, was in the notion that all learning, including intellectual subject matter, had to be by doing.[10]

The consequences of emphasizing the student as natural learner and the primacy of problem solving are much more serious than many people would think. As Evers points out:

> Dewey himself always emphasized the natural impulses of the child more than intellectual training and discipline. He explicitly says that the "primary root" of "all educational activity" is not the presentation and mastery of subject material, but rather the instinctive, impulsive attitudes and activities of the child. His even more child-centered disciples … just took Dewey's own emphasis further. Because Dewey would not give priority to learning the subject matter, he bequeathed his successors an approach to educational reform that didn't have within itself a nonsense detector. Nothing clearly excluded or ruled out such notions as all schoolwork should be play (or to put it another way, all schoolwork should be exciting, fun, hands-on projects, undertaken without regard to whether they improve scholastic achievement).[11]

## William Heard Kilpatrick

Another influence on proponents of student-centered teaching methodologies is William Heard Kilpatrick, the education philosopher and author who taught at Columbia University's Teachers College in the first half of the 20th century. Kilpatrick agreed with Dewey's ideas and popularized them in his lectures and books. His 1918 article advocating a project method of teaching, which recommended student-centered project activities rather than teacher-centered subject-matter learning, was and continues to be highly influential in the education academy. It is estimated that Kilpatrick trained 35,000 students during his career at Columbia, many of whom went on to staff the new schools of education that were being established across the country.[12]

Perhaps Kilpatrick's most remembered and still cited work is his 1925 book, *Foundations of Method*, which lays out most of the now accepted principles of student-centered teaching. According to University of Virginia professor E.D. Hirsch, well-known education author and a Kilpatrick critic, in *Foundations of Method*, Kilpatrick argued for the insistence upon the individuality of the child and the autonomy of the teacher. Kilpatrick disparaged mere subject matter and the teaching methods of other nations. He admonished his followers to teach children rather than subjects, and claimed that knowledge is changing so quickly that no specific subject matter should be required in the curriculum. The Columbia professor attacked rote learning, tests, and even report cards.[13] All of these beliefs are part of, at least in some form, current progressive student-centered education thinking—the thinking that now predominates at university schools of education.

Although Kilpatrick's term "project method" is now little used, Hirsch notes that his methodology lives on under other names "such as 'discovery learning,' 'hands-on learning,' 'holistic learning,' 'learning by doing,' and 'thematic learning'."[14] As we shall see later, the failure of these various modern incarnations of Kilpatrick's method are rooted in the basic flaws in the student-centered theories advocated by Kilpatrick and his think-alikes. As Hirsch says, "it has been the fundamental unsoundness of the Kilpatrick approach that has generated the suspicion—often mixed with contempt—with which education professors and experts are often regarded by their colleagues and, increasingly, by the general public."[15]

## Jean Piaget

The psychologist Jean Piaget is a more recent influence on student-centered thought. Piaget theorized that all children go through a series of defined stages of development: from the sensory-motor (birth to two years of age), to the preconceptual (two to four or five years of age), to the intuitive (four or five to seven years of age), to the concrete operational (seven to 11 years of age), and the formal operational (11 to 16 years of age).[16] Noted psychologist Robert Siegler observes that "the dominant impression of children's thinking that emerges from [Piaget's] work is that at almost all times, a child of a given age will think of a given problem in a certain way, one that reflects the child's cognitive structure at the time."[17]

Despite Piaget's popularity among educators, Siegler points out that "At present, there is no dominant theory of cognitive development."[18] Piaget's ideas, along with those of his followers (often referred to as neo-Piagetians), have, says Siegler, "proved to be inconsistent with a great deal of data."[19] For instance, researchers have found that children exhibit greater competence at much earlier ages than envisioned by Piaget's theories.[20]

Despite the lack of empirical evidence to support his theory of child development, educators are still drawn to Piaget because of the implications of his ideas for teaching and learning. Says Jeanne Chall:

> This growth of cognitive power, according to Piaget, stems mainly from the development of the ability to symbolize. And the force for this development comes mainly from the child—from his or her readiness—not from school learning. Piaget made few references to the influences of parents or teachers in stimulating the child's cognitive development, concluding in effect that the foundation of cognitive growth is in the child's own activities rather than in instruction.[21]

Despite the lack of empirical evidence to support his theory of child development, educators are still drawn to Piaget because of the implications of his ideas for teaching and learning.

In Piaget's own words, "each time one prematurely teaches a child something he could have discovered for himself the child is kept from inventing it and consequently from understanding it completely."[22]

Based on this theory of childhood development, Piaget also hypothesized about children's method of understanding. J.E. Stone, an educational psychologist at East Tennessee State University and a top authority on teaching methodology, and his colleague Andrea Clements, describe Piaget's "adaptation-assimilation-accommodation" model:

> Piaget viewed intellectual growth as the prime outcome of education and experience the best teacher. Piaget's concept of "adaptation" argues that children construct a personalized grasp of the world by alternately "assimilating" various understandings of the world (called schemata) and refining those understandings through "accommodation." The aim of schooling from the Piagetian perspective is to optimize the "growth" of the individual by fitting educational experience to the characteristics and proclivities of the individual student. Attainment of conventionally measured student achievement is a secondary and incidental outcome.[23]

Piaget's speculations about childhood cognitive development helped spawn the belief that learning had to be developmentally appropriate, that is, that learning had to match the stage of a child's development. Although some Piaget supporters admit that Piaget's age categories might be too strict or arbitrary, they, nonetheless, continue to believe that prematurely exposing children to overly difficult schoolwork



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discourages them, damaging their view of school and learning. According to Stone and Clements:

> [Developmentally appropriate practice or] DAP seeks to facilitate the construction of understanding (i.e., intellectual development) in ways that are compatible with the level and pace of the individual's developmental trajectory. It is thoroughly child centered in the sense that children are not prodded or induced to undergo experiences that might be incompatible with what Piagetians suppose is a naturally shaped and therefore optimal developmental progression. DAP avoids subjecting the child to any sort of normative expectations for effort or accomplishment because even these subtle pressures might put a child's longer-term intellectual development at risk.[24]

As in the cases of Dewey, Kilpatrick, and Piaget, there is little empirical support for Vygotsky's theories.

Yet, as mentioned, the empirical data and most psychologists disagree with Piaget and his supporters. As Hirsch points out, "The consensus among psychologists is that after age six or so, school-based learnings follow a sequence determined not principally by nature or by chronological age but mainly by prior knowledge, practice and experience."[25] Stone and Clements observe that developmentally-appropriate practices encourage "teachers to await the appearance of intellectual readiness even if a child's apparent lack of readiness is due to deficient motivation—a waiting period that may place the individual far behind peers."[26] Yet, say Stone and Clements, for Piagetians the possibility of slow or retarded academic progress does not matter:

> However, from the DAP's proponents and that of other constructivists, the delayed academic progress of some students is not any legitimate grounds for criticism. In their view, DAP is intended to produce a pattern of intellectual growth unique to the individual, not a pattern of achievement that compares favorably to norms. Thus, exponents would reject the view that DAP is ineffective merely because students fail to learn as defined by conventional measures. Rather they believe that DAP protects children from overly ambitious expectations—a questionable trade-off in the view of the few parents and other consumers who understand DAP's aims.[27]

For these reasons, Piagetians prefer self-evaluation by children over adult-created-and-administered tests. Self-evaluations by children allow children to display their own intellectual growth as opposed to tests which measure only what adults believe children should know.

## L.S. Vygotsky

Another psychologist, the Russian L.S. Vygotsky, is also widely cited by enthusiasts of student-centered learning. Vygotsky created the idea of a zone of proximal development. This zone is the difference between a child's actual developmental level (those things the child can do on his or her own) and the child's potential level (those things the child can do with the help of an adult or in cooperation with higher-performing peers). Based on their zone of proximal development, students perform according to their own limits of competence while being supported by teachers and others to realize higher levels of performance.

According to Robert Glaser of the University of Pittsburgh Learning Research and Development Center, Vygotsky's idea is readily translated into the real-world classroom:

> In classroom learning communities or "communities for knowledge building," students participate in the transmission of knowledge by seeking, sharing, and acquiring knowledge among themselves with continued teacher guidance. These communities of knowledge building are distinguished by efforts to turn over processes that are usually under a teacher's control to the students. Students are helped to formulate goals, direct their own inquiry, monitor their understanding, and use the resources available to design their own settings for acquiring knowledge. In this participatory environment for learning, teachers and students share the expertise they have or take responsibility for finding out about needed knowledge that they can bring back to the group. Teachers often teach in response to student needs, rather than in fixed sequence, but the curriculum consists of topics to which students return deepening knowledge and understanding. A community of discourse exists in which learning through constructive discussion, conjecture, questioning, criticism, and presenting evidence is practiced as the normal thing to do instead of the exception.[28]

As in the cases of Dewey, Kilpatrick, and Piaget, there is little empirical support for Vygotsky's theories. Indeed, Carnegie Mellon University psychologists John Anderson, Lynne Reder, and Herbert Simon, in their review of the influence of cognitive psychology on teaching methods, concluded that "Modern attempts at educational improvement point back to theorists (Piaget, Vygotsky, and Dewey) whose theories are vague by current psychological standards and lack the strong connection to empirical evidence that has become standard in the field."[29]

Despite this paucity of empirical support, however, the ideas of Dewey, Kilpatrick, Piaget, Vygotsky, and other leading progressive educational theorists have served as the basis and foundation for a set of student-centered teaching methodologies that continue to dominate schools of education, and consequently the views of much of the teaching profession. What follows is a description of these methodologies.

## Constructivism

The reigning student-centered pedagogical buzzword in schools of education is constructivism. As we shall see, it is used proudly by schools of education to describe their philosophical approach to teaching. The constructivist teaching philosophy, or radical constructivism, to which it is also sometimes referred, believes that children "construct" their own knowledge. According to Dr. Tom Loveless, director of the Brown Center on Educational Policy at the Brookings Institution:

> The premise of constructivism implies that the knowledge students construct on their own, for example, is more valuable than the knowledge modeled for them; told to them; or shown, demonstrated, or explained to them by a teacher. Echoing the historical mantra of progressive education, constructivists argue that the essence of education—its means, ends, and motivating force—should be generated from within the learner, not decided by an external source. The teacher, the textbook, the curriculum, indeed, the entire school and the external authorities it embodies are recast as facilitators in the student's construction of new knowledge, no longer the sources of it.[30]

In terms of concrete classroom activities, Dr. Loveless says:

> Constructivism also strives to steer clear classrooms away from such traditional, fact-oriented learning as knowing the rules of spelling and grammar, knowing the rules of punctuation and capitalization, memorizing the multiplication tables and other basic arithmetical facts, and acquiring the basic decoding skills related to sound-symbol relationships. Instead, learning is directed toward problem solving, critical thinking, learning how to work in groups, and developing a healthy self-esteem. Basic skills are recognized as useful, but they are not given top priority in the constructivist classroom, nor is their mastery presumed necessary before higher-order tasks can be tackled.[31]

The emphasis on problem solving as the means for learning is crucial for constructivists. Taking their cue from Dewey, Piaget, and other progressives that children are naturally curious and natural learners, constructivists believe that, once presented with a problem, children will use the problem to construct their knowledge of the subject through their own exploration and investigation. Problems, therefore, allow children to invent their own knowledge, and this knowledge, because it is self-generated, is more likely to be retained and used in the future. Because this process of exploration, investigation, and construction of one's own knowledge takes advantage of children's natural propensities, children will also view the learning process as enjoyable, thereby increasing the chance that they will want to learn even more.

The conviction that the constructivist learning process will result in a joy of learning is one of the methodology's major selling points. As Florida State University psychologist K. Anders Ericsson notes, teachers are warned not to interfere with the

process too much, even if students are not getting the technically-correct answer, lest students become discouraged:

> Finally, the inherent enjoyment of engaging actively in reasoning and problem solving can be fostered only if students generate or choose the problems as their own. Based on these considerations, radical constructivists recommend educational settings where students are forced to take the initiative and guide their own learning. Many radical constructivists even discourage the teacher from correcting students when their reasoning and ideas are invalid because such criticism may jeopardize their self confidence in their independent reasoning and challenge their self-respect. In sum, radical constructivists believe that self-guided learning will lead to genuine understanding and to skills for independent thinking and meaning.[32]

Taking their cue from Dewey, Piaget, and other progressives that children are naturally curious and natural learners, constructivists believe that, once presented with a problem, children will use the problem to construct their knowledge of the subject through their own exploration and investigation.

Given constructivist beliefs that students construct their own knowledge and that teachers should refrain from overcorrecting student performance, it is not surprising that constructivists generally have a negative view of student testing and assessment. According to the constructivist D.H. Jonassen:

> If you believe, as radical constructivists do, that no objective reality is uniformly interpretable by all learners, then assessing the acquisition of such a reality is not possible. A less radical view suggests that learners will interpret perspectives differently, so evaluation processes should accommodate a wider variety of response options.[33]

Thus, even when constructivists agree that assessment is warranted, they advocate focusing on the learning process rather than on what is actually learned, which in turn leads to assessment devices that are more subjective and less precise.[34]

Although most parents and members of the public oppose constructivist teaching methods, and despite the fact that, as will be seen later, there is little empirical evidence to support constructivism, most teachers view themselves as constructivists. According to a national survey of teachers, up to three times as many teachers favored constructivist beliefs on teaching methods, as opposed to those who favored traditional methods. According to the survey analysis, "as a whole, U.S. 4th through 12th grade teachers believe in a much more constructivist basis for teaching than they are often given credit for."[35]

What does a constructivist classroom actually look like? At Columbus Elementary School in Berkeley, where per-pupil funding is high but test scores are low, *Los Angeles Times* education reporter Richard Lee Colvin discovered constructivism in action:

> Ann Gilbert, a fifth-grade teacher, watched as her students worked in pairs measuring the angles of various geometric shapes. The point of the exercise was to discover that the size of the angles in five-sided shapes always



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> add up to the same. But she wasn't telling her students that. Even when they came up to her with questions, she didn't clue them in. "Such a lesson probably won't pay off in higher test scores immediately," she said. "But it will by the end of high school because they'll really know it," she said.[36]

K. Anders Ericsson points out that, "when educators propose to remove guidance and feedback from learning activities, one might worry that these more playful activities may be more enjoyable but at the direct expense of their effectiveness in improving performance."[37] Indeed, anecdotal evidence of the pitfalls of constructivism, such as the example of Columbus Elementary, is supported by the bulk of empirical research data. A full discussion of this research will follow the descriptions of the other major student-centered methodologies.

The most popular recent constructivist teaching method is called discovery learning. It is used to teach a variety of subjects, but is especially popular in math and science.

## Discovery Learning

The most popular recent constructivist teaching method is called discovery learning. It is used to teach a variety of subjects, but is especially popular in math and science. According to Williamson Evers:

> The basic idea of discovery learning is that people can only learn things and understand them (or, in a moderate version, can best learn things and understand them) when they discover them for themselves. Discovery learning calls for virtually the same instructional practices as John Dewey's—the idea that students should be put in a situation where they face some problem that is well known to educators but not to the students, and then the students are to reinvent solutions to the problem.[38]

A popular discovery-learning-based textbook on teaching science, authored by Joseph Abruscato, defines discovery learning in the following way:

> Learning through discovery is a personal, willful act on the part of the child that happens in an environment designed by the teacher. It is the teacher's professional responsibility to help children make discoveries that are important to their needs and interests and that will help them become more knowledgeable, literate, skilled, responsible human beings.[39]

Since students are at the center of the discovery learning method, the Abruscato textbook says that "The teacher's responsibility is to help children move through a continuing series of experiences that include hands-on work with science materials and to challenge children to make sense out of their discoveries through writing, library research, mastery of science vocabulary, and a host of other activities that lead them to make still more discoveries."[40]

Beyond the generalities, what are the actual stages of the discovery learning process? The Abruscato textbook cites a National Science Teachers Association publication which posits a three-stage discovery process:

1. *Exploration*. During this phase, the teacher plays an indirect role as an observer who poses questions and assists individual students and small groups of students. The students' role at this time is very active. They manipulate materials distributed by the teacher.

2. *Concept introduction*. During this stage, the teacher assumes a more traditional role by gathering information from the students that relates to their experiences. This part of the lesson is the vocabulary-building time. Textbooks, audiovisual aids, and other written materials may be used to introduce terminology and information.

3. *Concept application*. At this time, the teacher poses a new situation or problem that can be solved on the basis of the previous exploration experience and the concept introduction. As in the exploration phase, the students engage in some type of activity.[41]

Based on this three-stage learning process, the Abruscato text gives the following sample lesson plan for a grade K–1 class:

1. *Exploration*. Ask children, "Do you play with toys when you take a bath? If you do, what toys do you play with?" As they answer, list their bath toys on the easel paper. Ask, "Do your toys sink or float on the water?" Write an "S" in front of each item that sinks and "F" in front of each that floats. Display the collection of objects. Invite children to come to the front of the room or center of the learning circle to select an object and tell whether he or she thinks it will sink or float.

2. *Acquisition*. After all predictions have been made, ask children to classify the objects according to the predictions. Have a child help you pour water into the aquarium. Now have various children act as assistants and gently place each object in the water. Have the children reclassify the objects based on the results.

3. *Application*. Display the bag with the question mark [which contains an assortment of different objects that sink or float, including a rubber duck]. Tell the children that when they have free time, they can work at the table to classify the objects in the bag as to whether they will sink or float and then experiment to test their predictions.

As the follow-up assessment to this lesson, teachers are asked to observe whether any children offer to bring objects from home to test, whether their predictions about sinking and floating are correct, and listen for children to bring experiences with floating objects into classroom conversations.

## Thematic Learning

Another popular student-centered teaching approach is thematic learning. Hirsch describes this method as "the 'holistic' teaching of different subject matters across a common theme."[42] For example, says Hirsch, "the theme of 'The Seasons' might combine a study of history, art, science, and mathematics in a particular classroom, or grade, or throughout an entire school."[43] Although this general definition may not seem to require the method to be either student or teacher centered, theme-immersion theorists leave no doubt that theirs is a very student-centered approach.

In their textbook on thematic learning, Maryann Manning, Gary Manning, and Roberta Long describe their technique of "theme immersion" in the following way:

> Theme immersion is an in-depth study of a topic, issue, or question. Students engage in the planning of the study with the teacher. Together they find resources for information, determine the important issues for discussion, and decide how to communicate their learning. Specific content evolves as the [theme immersion] progresses; some students become interested in new topics as a result of their study and begin to explore areas that may not be directly related to the original topic, issue, or question. The role of the teacher is not to impose or control ideas but to be an active member of the community of learners.[44]

In thematic learning or theme immersion, teachers "support students as students explore and answer their own questions," and they don't motivate students "by dangling grades and rewards in front of them but by nurturing intrinsic motivation."[45]

Given this view, it is not surprising to find out that Manning, Manning, and Long are ardent disciples of Dewey. Not only are they influenced by Dewey's notion of children as innately curious and natural learners, they also agree with Dewey that the curriculum should not be a series of isolated subjects and that the "teacher must become his or her own curriculum maker."[46] In addition to Dewey, they also find support in Piaget:

> We have found that four of Piaget's basic principles provide strong theoretical support for theme immersion: First, students construct their own knowledge from within rather than have it imposed on them from some external source. Second, social interaction contributes significantly to students' construction of knowledge. Individuals think critically when they defend their own ideas while trying to resolve other points of view. Third, risk-taking and making mistakes are critical to learning. Finally, moral and intellectual autonomy are important educational goals.[47]

The Mannings and Long also say they are indebted to Vygotsky and his notion of a zone of proximal development: "If we want to work in a zone of proximal development, we must create classroom conditions that provide opportunities for a great deal of classroom interaction and collaboration."[48]

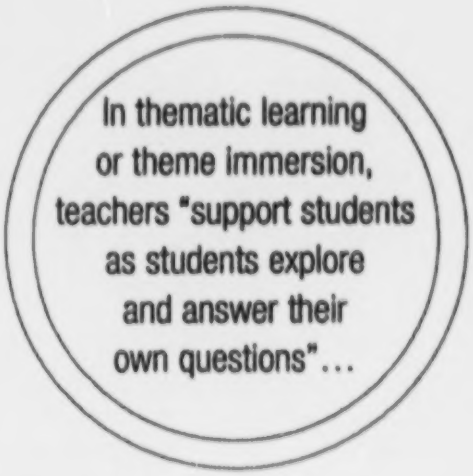
In terms of its actual classroom implementation, the first order of business is the choice of topic. Manning, Manning, and Long counsel that students and the teacher should work together to choose a topic that is "important to the classroom commu-

nity and the society at large."[49] Further, the topic "must be broad enough in scope to help students develop an awareness of the interconnectedness of the world."[50] Once the topic has been chosen, then the theme immersion activities ensue:

> There are no puzzles or cute games. There are no worksheets or set routines, such as answering all the questions on all the chapters in a textbook. Rather, the emphasis of [theme immersion] is on exploring answers to questions through reading in a wide variety of books, both fiction and nonfiction, getting information from other people, experiencing through community trips, demonstrations, simulations, role playing, and so on. Students work in committees and discuss issues. After they have gathered their information and clarified and elaborated on their thinking, they express their knowledge in any number of ways.[51]

How are students evaluated under theme immersion? Given the general anti-testing bias of most student-centered methods, it is not surprising that theme immersion opposes the use of most common assessment tools:

> [Theme immersion] evaluation procedures are qualitative rather than quantitative in nature. There are no pre-tests, post-tests, end of unit tests, or "bubble in the circle" exercises. Instead, teachers and students evaluate participation in the process of the [theme immersion]: "Were you a contributing member of your committee?" "How effective were you in finding answers to your questions?" Samples of individual student work are placed in student portfolios and committee and class work is displayed in the classroom and in school hallways.[52]


In thematic learning or theme immersion, teachers "support students as students explore and answer their own questions"...

In addition, Manning, Manning, and Long support the elimination of grading, especially in elementary school.[53] If, however, schools and school districts require grades, then grading should be based more on learning-process performance than on the products resulting from learning.[54]

The anti-testing, anti-grade position of supporters of thematic learning and other student-centered methods is a key selling point for many teachers. As Stone and Clements observe:

> In the learner-centered view, teachers are responsible for affording a quality educational experience, not the production of measurable academic outcomes. Learner-centered teachers consider outcomes to be governed by factors outside teacher control, thus the quality of teaching cannot be judged by results.[55]

It should be noted that thematic learning is often associated with a very similar methodology called holistic learning. Under holistic learning, classroom learning is based on integrated real-life problems and projects instead of standard subject matter.[56]

## Cooperative Learning

One aspect of schooling that student-centered progressives dislike intensely is competitiveness. Competition may be necessary and good for the marketplace and the workplace, but progressives do not believe that it belongs in the classroom. To progressives, competition means that there are a few winners and a lot of losers, and students who do not achieve at high levels are left with feelings of inferiority and apathy toward greater learning. That is why they prefer cooperative learning, a teaching method that has become increasingly popular during the last decade.

Cooperative learning helps eliminate competition from the classroom by focusing on group performance rather than individual performance. Under cooperative learning, students are broken up into teams whose members cooperate to complete various tasks and projects. Cooperative-learning theorists Dennis Adams and Mary Hamm describe a cooperative-learning classroom in the following way:

> In a cooperative classroom, the teacher organizes major parts of the curriculum around tasks, problems, and projects that students can work through in small mixed-ability groups. Lessons are designed around active learning teams so that students can combine their energies as they work toward a common goal. If someone else in your group does well, you do well, with the result that social skills such as interpersonal communication, group interaction, and conflict resolution are developed as the cooperative learning process goes along.[57]

Even when teachers allow students to ask them questions, they often respond not with an answer, but simply by encouraging students to work things out for themselves, consulting resources and peers.

Adams and Hamm say that cooperative learning is based on the idea that most learning takes place through children's interaction with others:

> Cooperative learning builds on this idea that much learning occurs in social contexts. Working in teams provides students with opportunities to talk about what each of them sees in classroom subjects and to participate actively in classroom life. The teacher acts as the students' pilot, selecting meaningful topics for discussion, mapping out opportunities for collaboration, and observing the interaction of the working groups in which students make connections between new ideas discussed in class and prior knowledge. As students are encouraged to jointly interpret and negotiate meaning, learning comes alive. Out of their regular opportunities to talk, read, write, and solve problems together, they construct meaningful explanations for themselves.[58]

As one can see, cooperative learning is decidedly student centered, with students interacting to teach each other and teachers acting as facilitators. Indeed, a basic rule in cooperative learning is that a student must ask at least two other students before asking the teacher when he or she is having trouble understanding a concept or problem.[59] Even when teachers allow students to ask them questions, they often respond

not with an answer, but simply by encouraging students to work things out for themselves, consulting resources and peers.[60] Not only do student-centered progressives believe cooperative learning is a better way for students to learn, they also believe that, given the supposed need for increased multicultural perspectives in learning, "In our pluralistic society, various mixed racial, gender, ethnic, and ability group structures in the classroom can also help students understand each other."[61]

Is there benefit to grouping high-ability students with their lower-ability peers? Yes, say cooperative-learning advocates, because in mixed-ability groups, "Students learn to take responsibility for their own learning and to assist the others in their group, combining personal initiative with social responsibility."[62] Further, "This allows those with more information to stimulate the students with less and vice versa."[63]

To ensure individual accountability, teachers are advised to base group scores on the aggregate of individual test scores, have students give individual presentations based on group projects, and have students work cooperatively to learn new material, while testing students individually.[64] However, open-ended questions on tests with subjective grading methods are preferred.[65]

## Critical-Thinking Skills

Critical-thinking skills is not a separate teaching methodology like discovery learning or thematic learning. However, it warrants some discussion because it is one of the key goals of all student-centered teaching methods. Critical-thinking, which is often associated with other student-centered terms such as "higher-order thinking" and "problem-solving skills," has been defined as occurring when "students construct meaning by interpreting, analyzing, and manipulating information in response to a problem or question that requires more than a direct, one-right-answer application of previously learned knowledge."[66]

Critical-thinking skills rely on a set of specific sub-skills, including focusing, information-gathering, remembering, organizing, analyzing, generating, integrating, and evaluating.[67]

Stimulating critical thinking among students, according to proponents of student-centered teaching, is crucial for a number of reasons. First, although they grudgingly recognize the importance of information, they argue that there will never be enough time to teach students all the information that will be useful to them. They claim that "when teachers take time from lecturing about knowledge in order to instill habits of inquiry and reflection, students will actually learn more even though less knowledge is covered."[68] Further, not only is it impossible to teach all useful information, it is impossible to know what information will be useful in the future. Therefore, say critical-thinking enthusiasts, it makes more sense to teach critical thinking, which is an intellectual tool "that can be used differently at different times and in different situations."[69]

How should teachers teach critical-thinking skills? Adams and Hamm recommend teachers adopt a "constructivist approach in teaching," that helps students "learn how to actively apply knowledge, solve problems, and promote conceptual understand-

ing," allows students "to change their poorly examined theories and beliefs to more rigorously examined concepts that are personally meaningful," and encourages them to "develop conceptual understanding and a means for integrating knowledge into their personal experience."[70] Adams and Hamm also recommend a shift "from a teacher-centered approach to a student-centered approach, from the teacher as authority figure who transmits knowledge to the teacher as facilitator of thinking."[71] The emphasis is no longer on the product of learning, but the learning process itself.[72] Students would then be assigned specific tasks, such as the interpretation of a literary passage or discussion of a news article, that would be accomplished cooperatively.[73] Other activities could include debates on controversial topics, role playing historical events, watching television broadcasts showing people with different points of view, and writing letters to the editor.

## Qualitative versus Quantitative Research

Proponents of student-centered teaching methodologies constantly claim that student-centered learning is more effective than traditional teacher-centered methods. They denigrate teacher-centered approaches as being 19th-century anachronisms with the teacher standing in front of the class using—and this is one of their most damning accusations—"drill and kill" methods, which require students to engage in repetitive drill and practice exercises, and emphasizing rote memorization. Children, say progressives, could never enjoy this style of teaching, let alone learn effectively through it:

> Yet these traditional methods of teaching and learning—primarily lecturing, listening, and working alone—were never effective for everyone.... Even those [children] who can sit still for these traditional methods do not learn much about thinking, articulating questions, or solving problems along a variety of paths; there simply cannot be much practice with higher-order levels of thinking when someone else does most of the important work for you.[74]

Trouble is, the bulk of empirical evidence disproves these and most other claims by advocates of student-centered methods. Although no method, whether teacher-centered or student-centered, is perfect for everyone, research clearly shows that on a wide array of indicators teacher-centered methods are more effective than student-centered methods in increasing student learning and achievement.

While it is true that supporters of student-centered approaches claim that their views are backed by research, most of that research is qualitative, i.e., descriptive and non-quantitative, in nature. Qualitative research relies on written descriptions rather than objective measurement. As Stone and Clements say, it is "subject to all the vagaries associated with written descriptions of any kind."[75] They note that since qualitative studies only describe, they "do not 'prove' or 'disprove' anything."[76] The major flaw, though, with qualitative research is observer bias:

> The vagueness of the methods used in qualitative studies invites observer bias. Observers are necessarily subjective in their observations....

> Although there are ways to make such observations more reliable, they are far more subject to researcher bias than most quantitative reports.[77]

Such research, though, which extols the virtues of student-centered learning, fills the pages of academic education journals.

In contrast, hard quantitative research based on, among other things, experimental methods (using control and experimental groups), quantitative data on student achievement (such as test scores), and methodologically sound interpretation (e.g., distinguishing between correlation and causation) is more rare, but also much more persuasive. Experimental research, for example, establishes whether an effect (e.g., improved student performance on tests) is the direct result of a given cause (e.g., type of teaching method). It is this hard research that, by and large, supports teacher-centered methods.

Although no method, whether teacher-centered or student-centered, is perfect for everyone, research clearly shows that on a wide array of indicators teacher-centered methods are more effective than student-centered methods in increasing student learning and achievement.

## Brophy and Good

In their 1986 review of dozens of methodologically-rigorous studies on teaching methods and student achievement (so-called "process-product" research that links teacher behavior to student achievement), education researchers Jere Brophy of Michigan State University and Thomas L. Good of the University of Missouri came to two very strong conclusions about the findings they examined:

One is that academic learning is influenced by the amount of time that students spend engaged in appropriate academic tasks. The second is that students learn more efficiently when their teachers first structure new information for them and help them relate it to what they already know, and then monitor their performance and provide corrective feedback during recitation, drill, practice, or application activities. For a time, these generalizations seemed confined to the early grades or to basic rather than more advanced skills. However, it now appears that they apply to any body of knowledge or set of skills that has been sufficiently well organized and analyzed so that it can be presented (explained, modeled) and then practiced or applied during activities that call for student performance that can be evaluated for quality and (where incorrect or imperfect) given corrective feedback.[78]

What does a high-achieving classroom look like? It is not a classroom where students are calling the shots and running the show. According to Brophy and Good:

> Achievement is maximized when teachers not only actively present material, but structure it by beginning with overviews, advance organizers, or review of objectives; outlining the content and signaling transitions between lesson parts; calling attention to main ideas; summarizing subparts of the lesson as it proceeds; and reviewing main ideas at the end. Organizing concepts and analogies helps learners link the new to the already familiar. Overviews and outlines help them to develop learning



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> sets to use in assimilating the content as it unfolds. Rule-example-rule patterns and internal summaries tie specific information items to integrative concepts. Summary reviews integrate and reinforce the learning of major points. Taken together, these structuring elements not only facilitate memory for the information but allow for its apprehension as an integrated whole with recognition of the relationships between the parts.[79]

Further, Brophy and Good emphasize that, based on the empirical evidence, it is the teacher who is the key to learning, and who, because he or she has the knowledge that students do not have, must be the central focus of the learning process:

> Students achieve more in classes where they spend most of their time being taught or supervised by their teachers rather than working on their own (or not working at all). These classes include frequent lessons (whole class or small group, depending on grade level and subject matter) in which the teacher presents information and develops concepts through lecture and demonstration, elaborates this information in the feedback given following responses to recitation or discussion questions, prepares the students for follow-up seatwork activities by giving instructions and going through practice examples, monitors progress on assignments after releasing the students to work independently, and follows up with appropriate feedback and reteaching when necessary. The teacher carries the content to the students personally rather than depending on the curriculum materials to do so, but conveys information mostly in brief presentations followed by recitation and application opportunities.[80]

Material should, in essence, be overlearned because "there is value in repeating and rehearsing basic material that will be used in subsequent learning."

This is definitely not a picture of the teacher as facilitator. Indeed, Brophy and Good observe that teachers that produce high-achieving students spend most of their time talking about content knowledge, not process: "There is a great deal of teacher talk, but most of it is academic rather than procedural or managerial..."[81]

## Rosenshine and Stevens

Brophy and Good's conclusions are supported by other researchers. Barak Rosenshine, a top education psychologist and researcher at the University of Illinois, has produced a series of studies validating the greater effectiveness of teacher-centered methodologies. In a 1986 review of experimental studies and correlational research on teacher training and student performance, Rosenshine and Robert Stevens, also of the University of Illinois, analyzed the data on the way humans process information. Based on this data, they made a number of important findings. First, when teaching new or difficult material, teachers "should proceed in small steps and provide practice on one step before adding another."[82] This small-step approach is

needed so the student can digest and learn manageable bits of information. Also, teachers should help students review relevant prior knowledge through "previewing lessons, telling students what they are going to learn; by relating the new information to what students have previously learned; and by providing organizers and outlines for the lesson."[83]

Rosenshine and Stevens also found that in order to process and transfer new information from working memory to long-term memory, people have to "elaborate, review, rehearse, summarize, or enhance the material."[84] Therefore, teachers "should provide active practice for all students."[85] Material should, in essence, be overlearned because "there is value in repeating and rehearsing basic material that will be used in subsequent learning."[86] A key fact, say Rosenshine and Stevens, is that:

> [N]ew learning is easier when prior learning is readily accessible or automatic. In a large number of academic situations the student needs to apply and use the knowledge and skills that have been previously learned. Retention and application of previously learned knowledge and skills come through overlearning, that is, practice beyond the point where the student has to work to give the correct response. This results in automatic processes which are rapidly executed and require little or no conscious attention. When prior learning is automatic, space is freed in our working memory, which can be used for comprehension, application, and problem solving.[87]

This emphasis on the importance of practice is supported by Carnegie Mellon's Anderson, Reder, and Simon. In their 1998 analysis of constructivism, they point out that, despite constructivists' claims that practice drives out understanding (the oft-repeated "drill-and-kill" argument), the evidence in favor of practice is beyond question:

> Nothing flies more in the face of the last twenty years of research than the assertion that practice is bad. All evidence, from the laboratory and from extensive case studies of professionals, indicates that real competence only comes with extensive practice. By denying the critical role of practice, one is denying children the very thing they need to achieve competence. The instructional problem is not to kill motivation by demanding drill, but to find tasks that provide practice while at the same time sustaining interest.[88]

California's mathematics framework, adopted by the state in 1998, and based on the state's tough 1997 math-content standards, highlights the importance of practice. Citing the empirical evidence, the framework says:

> Students must practice skills in order to become proficient. Practice should be varied and should be included both in homework assignments and in classroom activities. Teachers, students, and parents should realize that students must spend substantial time and exert significant effort to learn a skill and to maintain it for the long term.[89]

Practice and memorization of arithmetic facts are important, according to the framework, because, "The ability to retrieve these facts automatically from long-term

memory, in turn, makes the solving of more complex problems, such as multi-step problems that involve basic arithmetic, quicker and less likely to result in errors."[90]

Given their various findings, it is not surprising that Rosenshine and Stevens also find that "students taught with structured curricula generally do better than those taught with either more individualized or discovery learning approaches."[91] Like Brophy and Good, Rosenshine and Stevens emphasize that the crucial player in the learning process is not the supposedly naturally curious child, as progressives claim, but the teacher:

> It also explains why young students who receive their instruction from a teacher usually achieve more than those who are expected to learn new material and skills on their own or from each other. When young students are expected to learn on their own, particularly in the early stages, the students run the danger of not attending to the right cues, or not processing important points, and of proceeding on to later points before they have done sufficient elaborations and practice.[92]

A decidedly teacher-centered model of teaching, thus, produces results, while student-centered approaches are fraught with peril.

Based on the empirical evidence, Rosenshine and Stevens developed a six-part teaching model of fundamental instructional functions (shown in Table 1). Using parts of this model, they give an example of how it would work in a typical classroom situation:

> How would one teach two-digit multiplication (54 x 7) using these steps? The first step would be teacher demonstration of the steps followed in solving these types of problems. As part of the demonstration the teacher would model the use of the steps by doing problems on a chalkboard (or an overhead). This is followed by guided practice in which the students work two, three or more problems and the students are guided through the rules with teacher prompts. The teacher circulates and checks for student understanding as they do the problems. As the students become more proficient, the prompts are diminished. The frequency of student errors during guided practice gives the teacher an indication of whether any students need reteaching on the material. When a student or subset of students make frequent errors, the teacher would review or reteach the skill or process for those students or the entire class. When the students are firm in the guided practice, and are making few errors, they are moved to independent practice where they practice learning how to do the skill accurately and rapidly.[93]

The Rosenshine-Stevens model is about as far away as one can get from student-centered, constructivist learning. Yet, the bulk of evidence supports the superiority of such teacher-centered models.

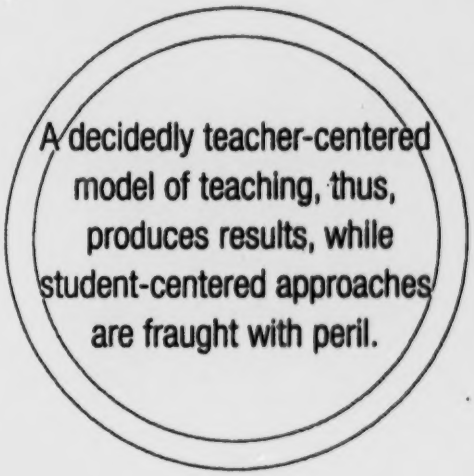
## Jeanne Chall

Jeanne Chall, in her 1999 book *The Academic Achievement Challenge: What Really Works in the Classroom?*, examined studies and data on teaching methodologies

stretching across the century in order to answer the question, "Does the informal, student-centered approach lead to better school achievement than the more formal, teacher-centered approach?"[95] Her analysis was comprehensive. She examined experimental research that compared achievement among matched groups of students, one educated under a teacher-centered approach and the other under a student-centered approach. She also examined early descriptive reports on the effects of more formal or less formal approaches and analyzed studies that compared student achievement in American private, parochial, and public schools and also Asian schools, which tend to be more teacher-centered.[96]

Based on this analysis, her conclusion was unequivocal. According to Chall, teacher-centered methods were more effective than student-centered ones:

> I found from these various studies that the traditional teacher-centered approach generally produced higher academic achievement than the progressive, student-centered approach. Only one study reported few consistent differences in achievement between progressive and traditional schools. But, it should be noted, none found that progressive, informal education resulted in higher academic achievement than the more formal, traditional education.[97]


A decidedly teacher-centered model of teaching, thus, produces results, while student-centered approaches are fraught with peril.

Chall observed that the evidence supporting teacher-centered methods was especially strong in reading and, to a somewhat lesser extent, in mathematics. In reading, teacher-centered approaches are usually characterized by direct instruction from the teacher, systematic instruction in phonics, the use of reading texts that have "controlled" vocabularies, and teacher-assigned literature and non-fiction works.[98] By contrast, student-centered methods rely more on "students' choice of reading materials, preference for children's literature for beginning reading instead of textbooks, and teaching phonics incidentally, 'as needed,' if at all."[99] Student-centered methods also usually support whole-language reading instruction which emphasizes the recognition of whole words (or even whole sentences), rather than letter-sound relationships (phonics), and reading for meaning.[100] In math, teacher-centered methods usually emphasize the importance of basic computational skills, while student-centered methods focus more on solving problems "in the context of real world situations."[101]

As in overall student achievement, Chall found higher student achievement in reading and math when teacher-centered approaches were used. Students did less well under student-centered methods because these methods assumed that students would somehow pick up basic content knowledge along their exploratory road of discovery:

> The new math and the new reading relied on the learners' "discovering" the skills—computation for math and word recognition and phonics (the alphabetic code) for reading. They assumed that "basics" come naturally from an emphasis on higher mental processes.... What the research has found is that


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**Table 1: Rosenshine-Stevens Teaching Model of Instructional Functions**

1. **Daily Review and Checking Homework**
   - Checking homework
   - Reteaching when necessary
   - Reviewing relevant past learning
   - Reviewing prerequisite skills

2. **Presentation**
   - Provide short statement of objectives
   - Provide overview and structuring
   - Proceed in small steps but at a rapid pace
   - Intersperse questions within the demonstration to check for understanding
   - Highlight main points
   - Provide sufficient illustrations and concrete examples
   - Provide demonstrations and models
   - When necessary, give detailed and redundant instructions and examples

3. **Guided Practice**
   - Initial student practice takes place with teacher guidance
   - High frequency of questions and overt student practice (from teacher and/or materials)
   - Questions are directly relevant to the new content or skill
   - Teachers check for understanding (CFU) by evaluating student responses
   - During CFU teacher gives additional explanation, process feedback, or repeats explanation—where necessary
   - All students have a chance to respond and receive feedback: teacher ensures that all students participate
   - Prompts are provided during guided practice
   - Initial student practice is sufficient so that students can work independently
   - Guided practice continues until students are firm
   - Guided practice is continued (usually) until a success rate of 80 percent is achieved

4. **Correctives and Feedback**
   - Quick, firm, and correct responses can be followed by another question or a short acknowledgment of correctness
   - Hesitant correct answers might be followed with process feedback (i.e., "Yes, Linda, that's right because...")
   - Student errors indicate a need for more practice
   - Monitor students for systematic errors
   - Try to obtain a substantive response to each question
   - Corrections can include sustaining feedback (i.e., simplifying the question, giving clues), explaining or reviewing steps, giving process feedback, or reteaching the last steps
   - Try to elicit an improved response when the first one is incorrect
   - Guided practice and corrections continue until the teacher feels that the group can meet the objectives of the lesson
   - Praise should be used in moderation, and specific praise is more effective than general praise

5. **Independent Practice (Seatwork)**
   - Sufficient practice
   - Practice is directly relevant to skills/content taught
   - Practice to overlearning
   - Practice until responses are firm, quick, and automatic
   - Ninety-five percent correct rate during independent practice
   - Students alerted that seatwork will be checked
   - Students held accountable for seatwork
   - Actively supervise students, when possible

6. **Weekly and Monthly Reviews**
   - Systematic review of previously learned material
   - Include review in homework
   - Frequent tests
   - Reteaching of material missed in tests

Source: Barak Rosenshine and Robert Stevens, "Teaching Functions," in *Handbook on Research on Teaching*, Merlin C. Wittrock, ed. (New York, NY: Macmillan, 1986): p. 379.[94]

> those who learn the basics early in school do better in reading and math—on tests of basic skills and ultimately in problem solving. Progress in higher level cognitive skills—problem solving in math and comprehension in reading—is usually slowed down when basic skills are not automatic.[102]

Thus, the automaticity that Rosenshine and Stevens say is critical to improved student performance, and which teacher-centered approaches reinforce through an emphasis on the solid acquisition of basic skills, is a key reason why teacher-centered methods outperform student-centered methods in reading and math. Further, it is this automaticity with basic skills and knowledge that is a prerequisite for success in higher-order-thinking activities such as problem solving. The California mathematics framework acknowledges this proven fact saying:

> Computational and procedural skills are necessary for the actual solution of both simple and complex problems, and the practice of these skills provides a context for learning about the associated concepts and for discovering more sophisticated ways of solving problems.[103]

## Direct Instruction

It is interesting to note that one specific teacher-centered approach, direct instruction, has been shown to be one of the most effective teaching methodologies when compared to other methods. Direct instruction emphasizes the use of carefully-planned lessons designed around highly specific knowledge and well-defined skills for each subject. Direct instruction asks teachers to use "presentation books," which are lesson plans that enable highly-scripted, rapid-paced instruction. These presentation books give teachers instructions for monitoring and assessing student progress, and for providing immediate feedback to students.[104] Also a placement test is used for initial assignment of students by performance level. The pace of instruction is determined by the performance level of each group. Students are tested frequently in order to monitor their progress.[105]

A 1999 American Institutes for Research (AIR) comparative study of 24 different teaching methodologies found direct instruction to be one of the very few methodologies to improve student achievement. The AIR study also found that direct instruction improved students' chances for later success such as high-school graduation and college admissions.[106]

In their analysis of 34 different studies which examined direct instruction, University of Oregon education professor Siegfried Engelman and his colleague G.L. Adams found that direct instruction was effective in improving overall student achievement, as well as achievement in language, reading, mathematics, spelling, health, and science.[107] More important, after analyzing the research data, Engelman and Adams found that on all comparisons children taught through direct instruction performed better academically than children taught through student-centered methods.[108]

The *Follow-Through* study, a comprehensive federal effort to analyze a wide range of different teaching methodologies, found that direct instruction increased student

achievement in math, reading, language, and spelling more than any other instructional practice.[109] Of the nine methods tested in the *Follow-Through* study, all but two were student centered. Five of the seven student-centered approaches produced worse results in comparison to non-treated control groups.[110] According to University of Oregon education researcher Bonnie Grossen, "Most analysts of the *Follow-Through* evaluation data concluded that teacher-directed instruction resulted in stronger academic outcomes than the popular child-centered models."[111] Even more interesting, Stone notes that direct instruction outperformed student-centered methods even though "the outcome measures included not only basic skills but 'higher-order' cognitive skills and a measure of self-esteem—the very sort of outcomes that learner-centered methods are intended to enhance."[112]

After analyzing the academic research on instructional methods, Herbert Walberg of the University of Illinois, Chicago found direct instruction to be one of three teaching practices that deserved mention for their ability to increase student achievement.[113] All three (the other two being mastery learning and computer-assisted instruction), noted Walberg, are "top down from the teacher's or textbook plan."[114]

In addition to improving academic achievement, direct instruction also improves students' feelings of self-worth. The AIR study noted that "Direct Instruction also appears to improve students affective behavior and social skills: self-esteem/concept, attitudes toward self and school, attribution of success or failure to self or outside, and sense of responsibility."[115] Summarizing the *Follow-Through* self-esteem indicators, Bonnie Grossen pointed out the irony that student-centered methods that openly sought to improve children's feelings of self-worth ended up having the opposite effect:

> The models that had improved self-esteem as their primary goal often had more negative outcomes, even on the self-esteem measures. The Direct Instruction model did not target self-esteem as a goal. However, the sponsors predicted that, by targeting academic success and engineering the instruction so students were highly successful every step of the way, self-esteem would result ... [T]hese predictions were accurate.[116]

Of particular importance to a demographically-diverse state like California is the evidence that teacher-centered methods are especially effective for children of low socioeconomic status (SES). Rosenshine and Stevens found that low-SES/low-achieving students "need more control and structure from their teachers: more active instruction and feedback, more redundancy, and smaller steps with higher success rates."[117] To accomplish this, say Rosenshine and Stevens, will require "more review, drill, and practice, and thus more lower-level questions."[118]

Chall found that students' prior knowledge is a key factor in determining the success of students being taught under a particular method. According to Chall, based on the research data, since low-SES students generally come to school with a smaller knowledge base, they are more likely to succeed under a structured teacher-centered approach: "Indeed, the evidence on the superiority of structured, teacher-centered methods for low-socioeconomic-status children is so consistent over the

years that it would be difficult to reject."[119] Low-income parents recognize what works and what does not, and usually oppose student-centered teaching, "because it is not as helpful in teaching the basic skills and it does not provide the discipline that children need."[120]

If research shows that student-centered methods in general are less effective than teacher-centered methods in improving student achievement, what does the research show regarding specific student-centered approaches?

## Research on Constructivism and Discovery Learning

In the case of constructivism and its closely associated cousin, discovery learning, the supporting evidence is lacking. Tom Loveless notes that:

> Without suggesting that constructivism endorses a social order out of *Lord of the Flies*, it is fair to say that authority definitely shifts from the adult to the child in the constructivist classroom. Research does not confirm the belief that such a shift in authority promotes learning. Studies of discovery learning, the last manifestation of student-centered instruction, suggest that placing youngsters at the helm of their own intellectual development is generally unproductive. Student-centered practices may be defended on ideological grounds—that granting students power, whether it is educationally beneficial or not, is intrinsically good—but empirical support for enhanced learning is weak.[121]

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This is not to say that asking students to do some exploration and investigation on their own is always bad. Even supporters of directed teacher-centered instruction readily say that some student-centered instruction, in the right circumstances, is warranted. E.D. Hirsch, for example, acknowledges that discovery learning can lead to better understanding and retention of knowledge. The point, though, says Hirsch, is not that discovery learning has no positive effects. Rather, it is that, for several important reasons, it is a comparatively inefficient methodology:

> First, students do not always make on their own the discoveries they are supposed to make; in fact, they sometimes make "discoveries" that aren't true. Hence, it is essential to monitor students to probe whether the desired learning goal has been achieved, and if not, to reach the goal by direct means. Second, discovery learning has proved to be very inefficient. Not only do students sometimes fail to gain the knowledge and know-how they are supposed to gain, but they do not gain it very fast. Research into teaching methods has consistently shown that discovery learning is the least effective method of instruction in the teacher's repertory.[122]


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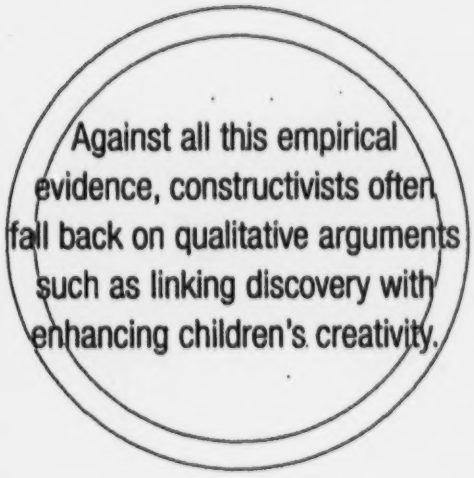
Hirsch's point is supported by Anderson, Reder, and Simon who likewise emphasize the inefficiency of constructivist discovery learning and the absence of empirical evidence for its efficacy:

> Getting students to generate much of what one wants them to learn is often difficult.... The argument that knowledge must be constructed is similar to the earlier arguments that discovery learning is superior to direct instruction. However, little positive evidence exists for discovery learning and it is often inferior. Discovery learning, even when successful in enabling the acquisition of the desired construct, may require a great deal of valuable time that could have been spent practicing the construct (which is an active process, too) if it had been learned from instruction. Because most learning only takes place after the construct has been discovered, when the search is lengthy or unsuccessful, motivation commonly lags.[123]


Against all this empirical evidence, constructivists often fall back on qualitative arguments such as linking discovery with enhancing children's creativity.

Anderson, Reder, and Simon also observe that in mathematics, constructivists recommend the use of complex problem solving because student discovery of knowledge through trial and error is inherently better than teacher-directed instruction. Yet, such a recommendation is "put forward without any evidence as to its educational effectiveness."[124]

Among the studies showing the inferiority of discovery learning are those by Brophy and Everston. In one of these studies, Brophy and Everston compared groups of Texas teachers and evaluated their effectiveness based on increases in student performance. In Brophy and Good's summary of the Brophy-Everston findings, teachers who produced the highest student achievement spent the "most time on academic activities."[125] Teachers who produced the lowest student achievement used approaches that "were more concerned with personal relationships and affective objectives than with cognitive objectives."[126] In other words, the teachers with the lowest-achieving students emphasized non-academic over academic objectives. Brophy and Good concluded that learner-centered discovery learning was ineffective.

If constructivist discovery learning has been shown to be inefficient and ineffective, what is it about this method, specifically, that produces such poor results? According to Anderson, Reder and Simon, the problem is two-fold. First, given that a complex task such as problem solving requires a knowledge base of many competencies, students having trouble with the components of a complex task because of their inadequate prior knowledge and competencies can be overwhelmed with the demands of the task.[127] Further, even if students have mastered many of the component skills required for the larger task, "the student will waste a great deal of time repeating those mastered components to get an opportunity to practice the few components that need additional practice."[128] Research shows that explicitly teaching

prerequisite knowledge, especially to young at-risk students, dramatically increases their achievement in subjects such as mathematics.[129]

Against all this empirical evidence, constructivists often fall back on qualitative arguments such as linking discovery with enhancing children's creativity. Yet, even here, the data are contrary. K. Anders Ericsson points out that the empirical evidence on creative achievement shows that individuals do not make creative contributions until they have spent a long time mastering component skills. Ericsson observes that "Even in the cases of revolutionary innovation where the creative ideas redefine the domains, the creative individuals have a long history of education during which they studied and mastered the existing techniques, such as Picasso."[130]

## Research on Cooperative Learning

What about cooperative learning? Anderson, Reder, and Simon cite a review of cooperative learning by the National Research Council Committee on Techniques for the Enhancement of Human Performance which found that research on cooperative learning has frequently not been controlled and that few studies show that cooperative learning is better than individual learning.[131] Further, the review found that cooperative learning spawned several detrimental effects, including free-rider problems and ganging-up effects.[132]

In addition, according to Hirsch, parents often complain that, since cooperative learning uses mixed-ability groupings of students, more capable children who want to do more and better work are discouraged on the grounds of not cooperating with the group.[133] Indeed, Adams and Hamm, in their pro-cooperative-learning book, say that, "Groups must try to reach a consensus on a problem."[134] Yet, they say nothing about what happens when that consensus happens to be incorrect, or about students who give in to the incorrect consensus even though they may know and support the correct answer. That higher-ability students may not benefit very much from cooperative learning is one of the downsides of the method, according to Stone and Clements. They note that although there is some evidence that cooperative learning does increase the achievement of low-performing students, "No studies of cooperative learning have found exceptional benefits for high-ability students."[135] Given that cooperative learning produces a disparity in student achievement gains, Stone and Clements ask whether social and motivational outcomes, which are fostered by cooperative learning, should be put on an equal plane with academic outcomes. In their view:

> The teaching profession may say yes, but the public would probably disagree. On balance, parents and policy makers want achievement to be an unrivaled priority. Most parents, especially parents of intellectually talented students, want their child's abilities maximized, not constrained by socially oriented pedagogy.[136]

Despite these problems and concerns, Anderson, Reder, and Simon note that large numbers of articles written by proponents of cooperative learning "gloss over difficulties with the approach and treat it as an academic panacea."[137] Thus, for example,

Adams and Hamm do not address the possible problems associated with the method. Hirsch concludes that although cooperative learning can be effective if combined with whole-class teacher-centered instruction, "It has not been effective when used as the principal or exclusive means of instruction."[138]

## Research on Critical-Thinking Skills

Finally, what about the claim that student-centered methods foster higher-order thinking or critical-thinking skills? Proponents of both student-centered and teacher-centered methods agree that critical thinking—analyzing information in order to solve complex problems—is a skill that all students should cultivate. The problem, however, is that as progressives emphasize critical thinking they also deemphasize factual knowledge. In this regard, it is worth analyzing an October 2000 study co-sponsored by the Educational Testing Service (ETS) and the Milken Family Foundation, and authored by Harold Wenglinsky of ETS. According to the study, "In math, students whose teachers emphasize higher-order-thinking skills outperform their peers by about 40% of a grade level." Although it sounds impressive, there's much less to this finding than meets the eye.

First, the study covers only a single grade—the eighth. Second, Wenglinsky's conclusion is not based on longitudinal data, i.e., data over a period of time. Rather, his conclusion is based on cross-sectional data, i.e., data at a single moment in time. In this case, Wenglinsky looked at eighth-grade test scores on the 1996 National Assessment of Educational Progress (NAEP) exam and correlated these scores with teachers who answered a NAEP questionnaire that asked whether they had taken a professional-development course that emphasized higher-order-thinking practices. Stone says that Wenglinsky's use of cross-sectional data is seriously flawed.[139]

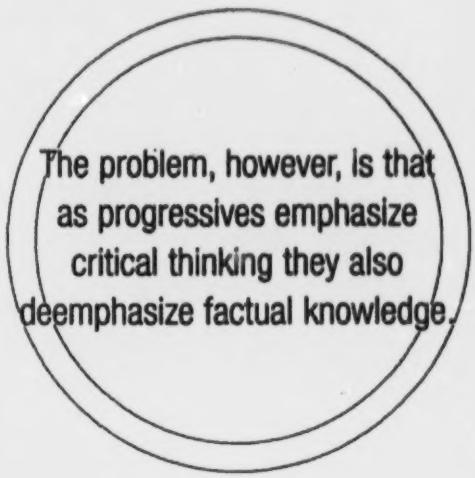
Wenglinsky himself admits that "The disadvantage of cross-sectional studies such as this one is that the outcomes occur at the same time as the factors that apparently influence them, raising the possibility that the outcomes influence the factors rather than the other way around."[140] Stone warns that "This caution needs to be stamped in red ink on the cover of this report."[141] He points out:

> As we all learned in the first week of Educational Psychology 101, correlation does not equal causality. That the teachers of higher-achieving students more frequently report the use of the higher-order methods does not necessarily mean that the methods are responsible for the higher achievement. Rather, it is far more likely that the fact of the students' higher achievement permitted teachers to use teaching methods that get beyond acquisition of the basics—an interpretation far more consistent with the (ignored) experimental literature.[142]

Indeed, as Stone notes, Wenglinsky fails to discuss the findings of Brophy and Good, Rosenshine and Stevens, and others who show conclusively that familiarity with lower-order basic knowledge and skills to the point of automaticity is necessary for higher-order problem solving. Wenglinsky also fails to address the research

evidence that practice, review, and drill are the best ways to guarantee automaticity of basic knowledge and skills. Instead, Wenglinsky cites qualitative studies that, as Stone points out, are "biased and gravely flawed."[143]

Wenglinsky's omissions are critical. Because Wenglinsky doesn't use longitudinal data, it's impossible to know whether the higher-achieving eighth-grade students in the study received their early-grades instruction through a teacher-centered practice-and-learn-the-basics method or a student-centered higher-order-thinking method. It may very well be that the achievement of the eighth-graders in the study is due not to the higher-order-thinking practices of their eighth-grade teachers, but to the lower-order methods of teachers in earlier grades. Wenglinsky admits this possibility saying that eighth-grade test scores may represent the cumulative impact of prior school and family influences, and that the higher-order-thinking methods of the eighth-grade teachers may then be "overshadowed by the impact of the practices of earlier teachers on students' test scores."[144] The Wenglinsky study, therefore, is, as Stone says, "flawed and misleading," and does not prove that higher-order-thinking methods are mainly responsible for higher achievement in the eighth grade.[145]




Higher-order-thinking/critical thinking is important. However, it is even more important to know how such thinking can best be achieved. Hirsch sums up what most people have known for a long time:

> Independent-mindedness is always predicated on relevant knowledge: one cannot think critically unless one has a lot of knowledge about the issue at hand. Critical thinking is not merely giving one's opinion. To oppose "critical thinking" and "mere facts" is a profound empirical mistake. Common sense and cognitive psychology alike support the Jeffersonian view that critical thinking always depends upon factual knowledge.[146]

## Teacher-Centered Methods Are Superior to Student-Centered Methods

In sum, the empirical evidence is quite clear. Teacher-centered methods are more effective than student-centered methods in improving student achievement. Indeed, as Hirsch emphasizes, "The research literature offers not one example of successful implementation of progressivist methods in a carefully-controlled longitudinal study."[147] Yet, despite the fact that teacher-centered methods produce the result that parents and the public want, i.e., student achievement, student-centered progressives are unfazed by these results. Why? According to Stone and Clements, the answer lies in the ideological tenets of progressive dogma:

> Learner-centered doctrine discourages the use of results-oriented research. Studies concerned with improving achievement typically test an intervention or treatment (i.e., an action taken by the researcher that is intended to



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> produce change in the student). The success of the intervention is judged in reference to some predetermined expectation. In contrast to the goal of inducing results, the goal of developmentally informed research [which is favored by progressives] is to accommodate schooling to the individual and to do so in a way that achieves the ends to which the individual is inclined by nature, not those prescribed by the curriculum.[148]

Thus, say Stone and Clements, even though, from a scientific standpoint, experimental studies, which favor teacher-centered methods, are far more convincing than qualitative studies, which are the mainstay of student-centered research, "school personnel often ignore the stronger and adopt the innovations suggested by the weaker."[149] Stone and Clements go on to say that the reason for this ignorance of evidential reality is because school personnel are "indoctrinated in learner-centered thinking, and powerful incentives encourage them to remain loyal to that point of view."[150] This paper now turns to the source of much of this indoctrination.

# Part 2 — Teaching Methods and the California State University Schools of Education

## Guiding Philosophies and Principles of California State University Schools of Education

Despite the weight of the evidence in favor of teacher-centered learning, California State University (CSU) schools of education are, for the most part, stalwart and aggressive advocates of student-centered teaching methodologies. Indeed, many of their mission statements and other descriptive documents often make explicitly clear their biases in favor of student-centered approaches.

Take, for example, the school of education at CSU Dominguez Hills in the Los Angeles area. In its "Conceptual Framework" document, which outlines the values, beliefs, professional commitments, philosophy, practice, and knowledge base promoted by the school, student-centered learning is front and center. The school states that after continuing dialogue with the faculty, "the knowledge base was defined as commonly agreed upon principles and practices which address diverse ways of knowing and theoretical and empirical approaches to the education process which inform our theory and practice."[151] And what are these commonly agreed upon principles and practices? According to the school, "experiential and collaborative approaches, cooperative learning, and methods which foster higher-order thinking."[152] Further, says the school, "Constructivist/cognitive approaches to teaching and learning inform our practice."[153] The school says that among the key experts that inform its philosophy are Dewey, Piaget, and Vygotsky.

Besides emphasizing student-centered teaching methods, the school of education at CSU Dominguez Hills is also up front about its political correctness. Thus, its "Conceptual Framework" states that "The effects of diversity, including gender, socioeconomic status, culture, ethnicity, socialization, and disability and considerations of language diversity are fully represented in the knowledge base." Interestingly enough, the experts cited as informing the school's views on language diversity include Jim Cummins, Stephen Krashen, and Kenji Hakuta, who are well-known partisans of native-language instruction, i.e., bilingual education, which, after passage of

Despite the weight of the evidence in favor of teacher-centered learning, California State University (CSU) schools of education are, for the most part, stalwart and aggressive advocates of student-centered teaching methodologies.



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California's Proposition 227 in 1998, is virtually banned in the state. Despite this reality, no English-immersion theorists and researchers are listed as contributing to the school's knowledge base.

CSU Dominguez Hills' political correctness does not end with continued support of bilingual education. The school of education also points out another influence on its philosophy: "The effect of oppression and power upon children is represented through critical theory." Among the experts cited is the radical leftist Brazilian education philosopher Paulo Freire. Freire, in his book *Pedagogy of the Oppressed*, views teacher-centered methodologies as tools of oppression, belittling them as banking approaches to teaching:

> In the banking concept of education, knowledge is a gift bestowed by those who consider themselves knowledgeable upon those whom they consider to know nothing. Projecting an absolute ignorance onto others, a characteristic of the ideology of oppression, negates education and knowledge as processes of inquiry. The teacher presents himself to his students as their necessary opposite; by considering their ignorance absolute, he justifies his own existence. The students, alienated like slaves in the Hegelian dialectic, accept their ignorance as justifying the teacher's existence—but, unlike the slave, they never discover that they educate the teacher.[154]

Freire views his protagonist, the humanistic revolutionary teacher, as very student-centered.

Freire believes that the more students work at storing the deposits of information entrusted to them under the teacher-centered banking theory of education, the less they will develop the critical consciousness needed to transform the world.[155] The banking theory "attempts to control thinking and action, leads women and men to adjust to the world, and inhibits their creative power."[156] The destruction of students' creative powers serves the interests of the oppressors "who care neither to have the world revealed nor to see it transformed."[157] The tranquility of the oppressors, in fact, "rests on how well people fit the world the oppressors have created, and how little they question it."[158] In other words, teacher-centered methods end up producing docile students ready to protect and fit into the oppressor-dominated status quo.

Freire views his protagonist, the humanistic revolutionary teacher, as very student-centered. According to Freire, teachers and students must together "engage in critical thinking and the quest for mutual humanization."[159] Revolutionary teachers must trust people and their creative power, and, therefore, "must be partners of the students in their relations with them."[160] The tool of this partnership is problem-solving in the context of real-world experience:

> Those truly committed to liberation must reject the banking concept in its entirety, adopting instead a concept of women and men as conscious beings, and consciousness as consciousness intent upon the world. They must aban-

> don the educational goal of deposit making and replace it with the posing of the problems of human beings in their relations with the world.[161]

The teacher, says Freire, "is no longer merely the-one-who-teaches, but one who is himself taught in dialogue with the students, who in turn while being taught also teach."[162] The end result is that both teacher and students "become jointly responsible for a process in which all grow" and "people develop their power to perceive critically the way they exist in the world with which and in which they find themselves; they come to see the world not as a static reality, but as a reality in process, in transformation."[163]

Stripped of its Marxist rhetoric and worldview, Freire's pedagogical theory is simply another variation on the same old student-centered theme. And like other student-centered theorists, he is wrong about the way in which students learn and think critically. He makes the usual mistake of creating a false dichotomy between critical thinking and factual knowledge. As was shown in the previous section, critical thinking requires a foundation of basic factual knowledge that is most effectively built through the teacher-centered methods that Freire so despises. Yet, despite the empirical holes in Freire's theory, CSU Dominguez Hills cites him as one of the major influences on the philosophy of its school of education.

The beliefs and philosophy of the school of education at CSU Dominguez Hills are not anomalous. At CSU Los Angeles, the framework for the school of education's master of arts degree in education (middle and secondary curriculum and instruction) states that "The philosophical foundation of our program is grounded in constructivist and scientific paradigms of learning, teaching, and schooling and established and contemporary research, wisdom of practice, and emerging policies and practices affecting public education."[164]

Among the influences on the school's conception of curriculum and instructions are: "(1) Humanism (Gardner, Dewey, Bruner), which is characterized by an emphasis on personal growth and development and experiential learning; (2) Constructivism (Vygotsky, Piaget), which focuses on the social construction of knowledge and curriculum as a developmental process; (3) Academic Curriculum and Instruction (Hirsch, Bloom), which recognizes the significant role of background knowledge and cognitive skills; and (4) Postmodern Critical Theory (Freire, Giroux), which links teaching, learning, and school to social change and assists in the development of a multicultural and global base (Banks, Chin & Gollnick, Hanvey)."[165] It may seem that the inclusion of the traditionalist E.D. Hirsch as an acknowledged influence acts as a balance to the abundance of progressive influences and theorists. But that's not really the case.

The CSU Los Angeles school of education says unequivocally that its graduate program "is based on a constructivist perspective of learning."[166] Although a bow is made to Hirsch and his now widely-publicized arguments in favor of a core of essential knowledge that all students should master, it is noteworthy that while Hirsch's 1988 pro-core-knowledge book *Cultural Literacy* is included in the document's bibliography, his 1996 book *The Schools We Need* is not. It is in the latter book where he sharply criticizes applied constructivist techniques, such as discovery learning,

saying that empirical results "do not justify an extreme or exclusive reliance on what is currently called 'constructivist' practice."[167] Yet, CSU Los Angeles says that its guiding principles of effective practice include Vygotsky's "zones of proximal development," the discovery-learning belief that "Teachers should build classroom communities that encourage inquiry and the negotiation of meaning as discoveries and interpretations emerge," and the critical-thinking stricture that "Schools and classrooms are for thinking reflectively and critically on knowledge and all underlying assumptions."[168] One also has to question how seriously Hirsch's core knowledge views are taken given that the school's program is influenced by a postmodernist perspective which the school says "raises questions about what is knowable, how it can be known, and the degrees of truth in that knowing."[169]

CSU Los Angeles's other masters programs exhibit the same progressive orientation. The philosophical foundation for the school's masters degree in education (reading and reading/language arts specialist credential) states that "The reading curriculum is drawn from the perspective of humanism and constructivism." Piaget and Vygotsky are cited again.

At San Jose State University, the college of education, in its rationale for its elementary education program, acknowledges the often conflicting teacher-centered and student-centered schools of thought.[170] Seeming to take a middle ground, the college says that it seeks to "prepare educational professionals who are capable of thorough analysis and responsible decision making; who can choose among many alternatives the ones that most closely fit the requirements of their own unique situations and contexts."[171] However, San Jose State University seems a bit uncomfortable with where thorough analysis may lead one.

Thus, the college of education approvingly quotes one theorist who says that "the results of research on effective teaching, while valuable, are not the sole source of evidence on which to base a definition of the knowledge base of teaching."[172] Rather, "Those sources should be understood to be far richer and more extensive."[173] The college then puts itself on the side of process, saying, "the faculty in Elementary Education believes that it is not the academic mastery of information that forms a worthwhile knowledge base, but rather it is the 'structuring and use' of information that becomes the true professional's knowledge base."[174]

San Diego State University's college of education states that the first major program goal for its multiple subject credential program with a crosscultural, language, and academic development emphasis (CLAD) is "to bridge the gap between theory and practice for prospective teachers." The college says that "Theoretical support for this goal can be found in the writings of John Dewey (*Democracy and Education*, 1916; *The School and Society*, and *The Child and the Curriculum*, 1956) ... "[175] In its standard on the development of professional perspectives, the college states that credential candidates "will explore the contributions of major educational theorists and research related to the elementary school curriculum as related to the needs of the diverse student."[176] The college says that "A few examples of educational theories examined are the following: whole language, cooperative learning, school effectiveness, social and cultural impact on learning, discovery

learning, critical pedagogy, clinical teaching, the integrated curriculum, developmental stages, theories of cognitive structures, and behavioral management."[177]

San Francisco State University's credential program with middle-school emphasis places its teaching candidates in schools that "are changing teaching methods to be more responsive to the needs of the early adolescent who is in transition from elementary school to high school."[178] What is San Francisco State's definition of being "more responsive"? According to the university's college of education, "Student-centered and project-based approaches, integrated thematic instruction, cooperative learning and experiential strategies are included in the criteria for participating schools in the middle level program."[179] Further, "Interdisciplinary approaches, team teaching, cooperative learning, thematic instruction, project-based and student-centered strategies and advisory define the instructional methods that are modeled by the instructors and built in to the course activities and assignments."[180]

San Francisco State says that its courses on the foundations of education are principally influenced by critical theory, citing Freire, among others. Instead of basing these courses on traditional disciplines such as history and philosophy, the school believes these courses should focus on "major social concerns of the day."[181] The school also observes that "Social constructivism, group work and democratic classroom structures, parent involvement, school community relationships, and systemic school reform are typical topics in the education course work."[182] Freire and Vygotsky are cited, among others.

San Francisco State says that its courses on the foundations of education are principally influenced by critical theory, citing Freire, among others.

In discussing its approach to human growth, development, and learning theory, San Francisco State says that:

> In order to promote learners' educational development, our graduates must have a sound understanding of learning theory and a repertoire of skills with which to translate theory into practice. While a diversity of theories and applications are presented, the underlying thrust of this component in all programs is to promote a learner-centered perspective.[183]

Indeed, the preceding statement seems to sum up the orientation of these various CSU schools of education. While other views and theories of teaching may be presented, the bias is definitely in favor of student-centered approaches.

## Courses and Required Readings at CSU Schools of Education

Although broad policy statements give one a general idea as to the philosophical orientation of CSU schools of education, one must look at the CSU's education courses and required readings to really understand why California teachers teach the way they do.

In order to obtain a teaching credential through the CSU, prospective teachers must complete various required courses. This coursework differs depending on



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whether, for example, a prospective teacher is pursuing a single-subject credential (usually middle- and high-school teachers), a multiple-subject credential (usually elementary-school teachers), or a credential with a bilingual emphasis.

At CSU Dominguez Hills, the preliminary credential coursework requirements for both multiple- and single-subject credentials include: 1) Introduction to Urban/Multicultural Classroom Elementary/Secondary/Bilingual, 2) Language Learning, 3) Multicultural Perspectives for Teachers, 4) Foundations in Education, and 5) Motivation and Learning. Multiple-subject-credential candidates are required to take: 1) Reading/Language Arts in Elementary Schools, 2) Elementary Math Methods, 3) Elementary Social Studies Content Related Reading and Writing, and 4) Elementary Science Methods. Single-subject-credential candidates are required to take: 1) Teaching Content Related Reading/Writing in Secondary Schools, 2) Secondary Teaching Methods I, and 3) Secondary Teaching Methods II (taken in credential subject area).

At CSU Dominguez Hills, it is unsurprising, given the school of education's stated philosophical orientation, that the required reading in several courses is solidly student-centered.

After taking these preliminary courses, prospective teachers then move on to coursework in fieldwork/student teaching. Multiple-subject-credential candidates must take: 1) Classroom Management Methods, 2) Student Teaching: Elementary, 3) Seminar: Elementary Student Teachers, 4) Elementary Art and Music Methods (for non-CSU Dominguez Hills liberal studies majors), and 5) Elementary Physical Education Methods (for non-CSU Dominguez Hills liberal studies majors). Single-subject-credential candidates must take: 1) Classroom Management Methods-Secondary, 2) Student Teaching: Secondary, 3) Seminar: Secondary Student Teachers, and 4) Interdisciplinary Teaching Methods. All candidates must also take a course on special-needs children, a health-education course, and a computer-education course.

A five-year preliminary credential will be issued to a candidate who has completed a bachelor's degree, completed the coursework described above with an overall GPA of 3.0 and no grade lower than "C," demonstrated subject-matter competence (through coursework waiver or test passage), completed the U.S. Constitution requirement (through a political science course or equivalent), and completed a second language requirement. Most CSU schools of education follow a similar coursework format.

For the purposes of this paper, several key questions must be answered. What is taught in these courses? Are teacher-centered or student-centered methods emphasized? Is empirical evidence or ideological belief the basis of the methods emphasized? The answers to these questions will shed light on the type of teachers and teaching methods that dominate California classrooms.

## CSU Dominguez Hills

At CSU Dominguez Hills, it is unsurprising, given the school of education's stated philosophical orientation, that the required reading in several courses is solidly

student-centered. For example, for the fall 2000 school year, the required reading for Secondary Teaching Methods I is the textbook *Methods that Matter* by Harvey Daniels and Marilyn Bizar. Daniels and Bizar make no effort to disguise their biases, saying that "So, yes, we admit it: Best Practice is just another name for progressive education."[184] Pointing to the various recommendations of national teacher associations such as the National Council of Teachers of Mathematics, they claim that there is consensus in favor of teaching methods that are: student-centered, experiential, reflective, authentic, holistic, social, collaborative, democratic, cognitive, developmental, constructivist, and challenging.[185] Based on this consensus, there should be shifts in teaching practices, including:

**Less**

- whole-class-directed instruction, e.g., lecturing
- student passivity: sitting, listening, receiving, and absorbing information
- prizing and rewarding of silence in the classroom
- classroom time devoted to fill-in-the-blank worksheets, dittos, workbooks, and other "seatwork"
- student time spent reading textbooks and basal readers
- attempt by teachers to thinly "cover" large amounts of material in every subject area
- rote memorization of facts and details
- stress on competition and grades in school
- tracking or leveling students into "ability groups"
- use of pull-out special programs
- use of and reliance on standardized tests

**More**

- experiential, inductive, hands-on learning
- active learning in the classroom, with all the attendant noise and movement of students doing, talking, and collaborating
- emphasis on higher-order thinking; learning a field's key concepts and principles
- deep study of fewer topics, so that students internalize the field's way of inquiry
- time devoted to reading whole, original, real books and nonfiction materials
- responsibility transferred to students for their work: goal setting, record keeping, monitoring, evaluation
- choice for students: picking their own books, writing topics, team partners, research projects
- enacting and modeling of the principles of democracy in school
- attention to varying cognitive and affective styles of individual students
- cooperative, collaborative activity; developing the classroom as an interdependent community
- heterogeneously grouped classrooms where individual needs are met through individualized activities, not segregation of bodies

- delivery of special help to students in regular classrooms
- varied and cooperative roles for teacher, parents, and administrators
- reliance on teachers' descriptive evaluation of student growth, including qualitative/anecdotal observations[186]

Despite Daniels and Bizar's claim that the student-centered "Genuine Best Practices" they support have "a deep basis in research," the reality, as this paper has pointed out, is completely the opposite. Hirsch sharply criticized a nearly identical "less and more" list, contained in a 1993 book co-authored by Daniels, saying:

> No studies of children's learning in mainstream science support these generalizations. With respect to effective learning, the consensus in research is that their recommendations are worst practice, not "best practice."[187]

Stone also criticized these "best practices" for producing outcomes that "may or may not include the basic knowledge and skills sought by the public and most policymakers."[188] Such basic knowledge and skills as those required, for example, in California's rigorous academic content standards. Indeed, given the empirical evidence that the methods called for by Daniels and Bizar are comparatively ineffective and inefficient, new California teachers influenced by Daniels and Bizar's recommendations could undercut the policy and educational preferences of Californians and their elected representatives.

Among the specific "best practices" advocated by Daniels and Bizar is integrating the curriculum. Daniels and Bizar believe that teaching subjects such as math, science, and reading separately "too often leaves students with a disconnected view of knowledge and fails to reflect the way that real people attack real problems in the real world."[189] In their view, "students can learn subject matter—even mandated content and 'basic skills'—in the midst of complex, holistic, integrated experiences, and not just through separate and sequential lessons."[190] Thus, they support practices where students and teachers brainstorm and list student questions and issues, units of the curriculum are collaboratively developed by teachers and students, and teachers "back-map" from student questions to mandated ingredients in state and district curriculum guides. According to Daniels and Bizar, "students can no longer be viewed as cognitive living rooms into which the furniture of knowledge is moved and arranged by teachers, and teachers cannot invariably act as subject-matter experts."[191] Rather, they say, "In classrooms where students are helping to plan and negotiate the curriculum, teachers need to ask their own authentic questions right along with the students and pursue ideas that are new to them, just like everyone else."[192] In other words, teachers and students have equivalent status.

It is important to note that Daniels and Bizar give little evidence that an integrated curriculum and its associated project activities result in higher student achievement. Most of their discussion is anecdotal relating teacher experiences with integrated curriculum activities. They use descriptions such as "powerful" and "energized" to describe various integrated curriculum activities, but with little hard evidence. Inter-

estingly, they quote a group of teachers who pushed an integrated curriculum on their students and received a startling response from one of them:

> More than once we questioned whether we were on the right track, and there were times when we inwardly agreed with the student who said that "it would be a lot easier if you two just taught and we just obeyed and learned!" Easier, probably. Better? We thought not.[193]

Daniels and Bizar fail to see the irony that if they truly believed in a student-centered classroom, then if students prefer a teacher-centered instructional method, shouldn't their wish prevail? Further, neither Daniels and Bizar nor the teachers they quote give any evidence that their student-centered integrated curriculum method is really better than the teacher-centered approach urged by the student. The teachers' statements and beliefs are simply taken as true on their face. Yet, as Hirsch notes, the process-product research "has shown that what children bring away from naturalistic, 'integrated' learning is likely to be highly variable and uncertain."[194]

Indeed, given the empirical evidence that the methods called for by Daniels and Bizar are comparatively ineffective and inefficient, new California teachers influenced by Daniels and Bizar's recommendations could undercut the policy and educational preferences of Californians and their elected representatives.

Daniels and Bizar also advocate collaborative learning, basically another name for cooperative learning which has been discussed earlier in this paper. In a collaborative classroom, "projects are often substituted for workbooks and worksheets and where questions and inquiry—rather than textbooks and rote learning—become the guideposts of learning."[195] Further, say Daniels and Bizar, "The classrooms are decentralized and student-centered, which is to say that students' work, very often organized in the form of pairs and teams, partnerships and task forces, is the center of attention."[196] Again, support for their labeling of collaborative learning as a "best practice" comes mainly in the form of the anecdotal descriptive experiences of teachers. Daniels and Bizar fail to address the empirical criticisms of cooperative learning mentioned earlier in this paper.

Classroom workshops are another "best practice" supported by Daniels and Bizar. Classrooms should be turned into workshops where "children learn by doing."[197] According to Daniels and Bizar, "The classroom workshop is the pedagogical embodiment of constructivist learning; in a workshop, students and teachers reinvent whatever field of study they are engaged in."[198] During workshops, "students collaborate freely with classmates, keep their own records, and self-evaluate."[199] Yet, despite labeling it a "best practice," Daniels and Bizar admit, "Nor do students always take smoothly and effortlessly to the workshop model: on the contrary, implementation can be bumpy, tricky, and slow, even for dedicated teachers in progressive schools."[200] Again, the issues of comparative inefficiency of student-centered constructivist methods are raised by such admissions.

It is unsurprising that given the near total absence of any empirical evidence that their student-centered "best practices" are better than traditional teacher-centered



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methods in raising student achievement, Daniels and Bizar attack standardized tests. Indeed, they literally ooze contempt for standardized tests by claiming that "The main use of standardized tests in America is to justify the distribution of certain goodies to certain people."[201] Claiming that standardized tests are biased against minority and low-income children, they charge that "And no matter what the test, does anyone seriously expect rich suburban kids, whose 'Nordic' neighbors create and sell these tests, to wind up at the bottom?"[202]

Their ferocious opposition to standardized testing is based on the claim that "The teaching methods that are effective in raising scores on tests of lower-level cognitive skills are nearly opposite of those strategies that develop complex cognitive learning, problem-solving ability, and creativity."[203] Thus, teachers "must abandon the innovative and challenging instruction in which they are engaged in order to 'dummy down' the curriculum to conquer the test."[204]

As described in this paper, student-centered constructivist methods are comparatively inefficient and ineffective...

In other words, since teacher-centered instructional methods improve student achievement as measured by standardized tests, teachers will be tempted to adopt those methods rather than the student-centered constructivist methods supported by Daniels and Bizar. Indeed, it drives Daniels and Bizar crazy—they admit that their views on standardized testing are "intemperate"—that "Because the statewide science exam covers scores of topics, teachers are afraid to let students linger for a whole month at the nearby riverside, studying the ecosystem in depth."[205] To which one replies: thank goodness. As described in this paper, student-centered constructivist methods are comparatively inefficient and ineffective, and if standardized tests force many of these methods out of the classroom, then that is another reason to support standardized testing.

It should be noted that, despite Daniels and Bizar's harangue against standardized tests, testing experts argue that multiple-choice standardized tests are more accurate than so-called "authentic assessments," which include performance assessments based on open-ended questions and portfolios of student work, favored by progressives. Susan Phillips of Michigan State University, one of the nation's leading experts on standards and assessment, has testified that multiple-choice tests give more individual examples of student knowledge and skills, are more consistent in scoring, are capable of measuring higher-order thinking skills, and are fairer than other non-standardized assessments.[206] In supporting standardized tests and opposing unstandardized tests (which he says are inherently unfair), Hirsch observes that "grade-by-grade standards and some form of fair grade-by-grade tests are logically necessary for monitoring and attaining grade-by-grade readiness."[207] It seems bizarre that in California, where Governor Gray Davis and the state legislature have crafted an entire accountability system based on standardized testing, prospective teachers are being told by Daniels and Bizar that a standardized test "always messes things up."[208]

In addition to the Daniels and Bizar book, the required readings at CSU Dominguez Hills are dominated by other constructivist works. A fall 2000 course in classroom management requires the book *Beyond the Silence*, edited by CSU Dominguez Hills professor J. Cynthia McDermott, who also teaches the class. In the book, McDermott advocates a democratic classroom where "all the participants—students, teachers, and paraprofessionals—have a voice in the decisions that are made."[209] McDermott bashes teacher-centered instructional practices saying:

> And yet we continue using a "teacher-dominates" banking model where we teachers, the experts, deposit information, dole out directions and advice, and ask them to respond on our terms. This model encourages passivity, resentment, and poor quality work. As important, it fails to encourage the necessary citizenship skills critical to democratic living.[210]

Yet, as we have seen, McDermott's charges are unsupported by the empirical evidence. Indeed, as Brophy and Good, Rosenshine and Stevens, and others have shown, there is a great deal of student-teacher interaction in a teacher-centered classroom. As Hirsch points out, this caricature of teacher-centered whole-class instruction is baseless:

> [Whole-class instruction] is caricatured by an authoritarian teacher droning on at the head of the class, or by passive, bored students, barely conscious and slumping in their seats, or by intimidated, fearful students, sitting upright and willing only to parrot back the teacher's words. These are not accurate descriptions of what effective whole-class instruction is. It is predominantly interactive, with much interchange between students and teacher; it makes frequent use of student performance and student comments on the performances; it involves consistent informal monitoring of the students' understanding; it engages all students by dramatizing learning in various ways. An overwhelming concurrence of reports from process-outcome studies shows that a predominant use of whole-class instruction constitutes the fairest and most effective organizing of schooling.[211]

McDermott alludes to the comparative inefficiency and ineffectiveness of the student-centered democratic classroom by admitting that "Some students may be reluctant to make decisions and take responsibility, and so the process bogs down."[212] She also warns that "Because democratic classrooms attend to tasks often ignored in other classrooms, you and your students may explore the curriculum more slowly."[213] The unsaid consequence of this is that the class may not get to some parts of the curriculum.

It is telling that the first contributor to McDermott's anthology is Alfie Kohn, an author, former teacher, and one of the most visible advocates of student-centered learning. Kohn has made a name for himself by opposing standards, testing, and accountability programs. Kohn opposes grading students, calling it "destructive," and saying that "Until we are able to work together to eliminate traditional letter grades, which I believe are inimical to real learning, we need to do everything we can in our

own classrooms to make them invisible."[214] Kohn, in fact, opposes any sort of extrinsic motivation, whether it be grades, praise, or any positive reinforcement for good work. A child's intrinsic motivation, he says, "is corrupted and attenuated by extrinsic motivation."[215] Yet, in a meta-analysis of the academic literature on intrinsic motivation, Cameron and Pierce found that the empirical evidence did not support an exclusion of external incentives from the classroom.[216]

In McDermott's book, Kohn says that "The best teaching is not where the teacher is most firmly in control."[217] Yet, Kohn readily admits what often occurs when teachers aren't in control:

> Another obstacle is that the students themselves are unaccustomed to freedom and react at least at first by engaging in more kinds of behavior, good and bad, than ever before because the controls have finally been loosened. They're able to exercise their autonomy for the first time and that's messy and noisy and aggravating. The teachers I've talked to always suggest patience and also bringing the students in on this very problem. Then, if for example students make ridiculous choices or sit there paralyzed, unable to do anything except to say "You're the teacher, this is your job," the great teachers are able to react without resentment and too much confusion. They say, "What a great topic for discussion! What's my job? How do you feel when someone tells you what to do all day? Will you say you're too young to make decisions?"[218]

If this sounds ridiculous, that is because it is. While it is not impossible for students to learn under so-called "democratic" conditions, the amount of time wasted and opportunities lost is significant. Jessica Fairbanks, an elementary-school teacher and contributor to McDermott's anthology, says that "Attempting to create a democratic classroom where student voices are heard and valued is an incredible daily struggle."[219] She recounts one particular incident:

> Things do not always go the way I would like. For example, on a recent trip to the library, the class got very noisy. I was patiently waiting at the end of the line knowing that they would be able to work out the problem. By the time they did, it was too late to check out any books. They were crushed![220]

Because Ms. Fairbanks refused to be the "authoritarian" teacher, her students spent time in needless discussion instead of using the library as an educational resource, thereby losing the opportunity to check out books, losing the opportunity to do any reading that day or evening, and losing the opportunity to do any writing based on the library books. Such episodes, which are common, are precisely the reason why student-centered methods, such as democratic classrooms, are inefficient. Kate Thomas, a substitute teacher and contributor to McDermott's book, says that "Gaining a true democratic vote—consensus—can be extremely time consuming, frustrating, and takes heaps of practice."[221]

But the fact that democratic classrooms waste a lot of time that could be used to cover content areas is of little concern to progressive educators. Terry O'Connor of

Indiana State University, another contributor to McDermott's anthology, blatantly states that:

> Instead of content, student growth and development become the markers for activities. Lesson plans are designed around changes in learners rather than content coverage.[222]

Subject-matter knowledge takes a backseat to the supposed psychological needs of students.

McDermott herself, in one of her own chapters, describes how unquestioningly she expects her students to view student-centered constructivism. In discussing her class at CSU Dominguez Hills on interdisciplinary methods (a required course for the single-subject credential), she states that one of the non-negotiable "givens" of the class is to, "Explore varying views of the constructivist classroom, particularly student-centered approaches, through theory, practice, and research."[223] In the students' final self-evaluation, she explains what she means by "explore":

> What is your understanding of constructivism? Whose work fuels this point of view? Why do they believe what they believe? What happens to students (you) when this kind of model is presented? *Using yourself for research, did you try to take advantage of this powerful new model?* Were you willing to look at your own point of view and articulate it to me? *Were you engaged in helpful dialogue to create support and forward movement to practice this model?* Are you able to engage in this type of teaching now? What, for you, is the significance of experiencing the model instead of reading about it?[224] [Emphases added]

But the fact that democratic classrooms waste a lot of time that could be used to cover content areas is of little concern to progressive educators.

It seems obvious that unlike the democratic classroom she supports, there is little room in McDermott's classroom for any view except the constructivist view. Imagine a student in McDermott's class who supported the ideas of Hirsch or Chall. When informed of these "givens" and confronted with these questions, would such a student feel "safe" (to use progressive jargon) so that he or she could disagree with the student-centered bias of the course? Most likely, students would not. Although she may worry about students being intimidated and coerced in a public-school classroom, students in McDermott's class evidently must tow the progressive party line.

To ensure that there is no doubt as to the ultimate goal of progressive student-centered classroom democracy, McDermott concludes her anthology with a chapter by radical UCLA education professor Peter McLaren. McLaren boldly and baldly states that:

> Living under the sway of capitalist expansionism, corporate globalism, the destructive effects of consumer culture, and the juggernaught of imperial market forces, it is impossible to lose sight of the withering condition of



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> democracy and the triumph of neoliberalism. Hypostatizing accumulation above an ethics of democracy, contemporary incarnations of capitalist fundamentalism threaten to sever the arteries of whatever remains of the public sphere. Living in this historical juncture has strengthened my commitment and reaffirmed my resolve to realign critical pedagogy with liberatory politics, whose unembarrassed modus vivendi is anticapitalist struggle.[225]

In other words, student-centered practices are to be used as revolutionary tools to overthrow the American economic system. McLaren then cites Karl Marx, saying, "we need to keep focused pedagogically on the objective fact of what Karl Marx called the working day and the changing relations of production under global capitalism."[226] It is capitalism which, he believes, is destroying the working day and causing students to be in danger of losing their opportunity to have a working livelihood in the future. Therefore, McLaren claims that:

> A critique of global capitalism and its relationship to patriarchy, homophobia, and racism is fundamental to a transformative politics of classroom democracy. Social critique must become the fundamental cornerstone of a critical pedagogy of the new millennium.[227]

Although authentic assessment devices are supposed to be better tools for determining children's real interest and acquisition of science knowledge, there is more than a little subjectivity to this type of assessment.

McLaren then admonishes teachers to examine their democratic classroom practices so that they do not "reconfirm, reinitiate, or reposition our students more securely in relations of domination and subordination."[228] This evidently cannot be allowed to happen because teachers must prepare students, not to be cogs in the market economic system, but to be revolutionary storm troops who will bring the system down.

McLaren further states that the anti-capitalist struggle is also an anti-white struggle. He praises the massive influx of new non-white immigrants into America's classrooms and its effect on our culture saying that "As a result of this cultural smudging of codes, we can begin to redefine the meaning of United States citizenship and national identity."[229] His redefinition of national identity is blatantly anti-white:

> Whereas mainstream pedagogy too often engages students in the cruel theatre of assimilation, critical border educators are decentering Anglocentrism and redrawing the map of citizenship and identity from various perspectives and epistemologies. In such a climate students need to build democratic communities in classrooms so that the Anglo-imperial backlash against immigration, bilingual education, and multiculturalism, bolstered by a growing Latinophobia, can be stemmed by the furious solidarity of collective struggle.[230]

The democratic classroom, thus, is not only an anti-capitalist tool, but an anti-white tool as well. Students must be empowered, not to gain capitalist-oriented knowledge and skills, but to fight the dominating power of the white establishment.

In the fall 2000 course on elementary science methods, which is required for the multiple-subject credential, the mandated book is *Teaching Children Science: A Discovery Approach*, by Joseph Abruscato, which was discussed in this paper's earlier section on discovery learning. In addition to his discovery-learning approach to science, Abruscato urges cooperative-learning group work to achieve the goals of discovery learning.[231] He also discusses what he sees as the limitations of conventional tests and grades, favoring, instead, so-called "authentic assessment," which includes portfolios of a student's collected work, anecdotal records of teacher observations of student work, conferences with students, journals kept by students, student self-assessments, and affective development checklists.[232]

Although authentic assessment devices are supposed to be better tools for determining children's real interest and acquisition of science knowledge, there is more than a little subjectivity to this type of assessment. Take the affective development checklist. This checklist is used to see if students are "moving in the direction of enjoying science and science-related issues."[233] Among the items on Abruscato's checklist: the student is curious about new objects, organisms, and materials added to the classroom; talks about surprising things he or she notices in the environment; comments on science-related programs seen on television; comments on science-related films; asks questions about science-related news stories; and questions superstitions.[234] There is inherent subjectivity in such lists, which epitomizes one of the downsides of authentic assessments.

Abruscato urges that science be integrated with other parts of the curriculum. He says, for example, that the discredited "whole language" approach to reading instruction can be integrated with science:

> The teaching strategies of the whole language approach can be easily adapted to enrich and extend children's science experiences. Writing stories about butterflies and rockets, making "big books" about insects, and writing and singing songs about saving the earth's natural resources are activities that involve children in a variety of science topics and help develop their language arts skills.[235]

Abruscasto also advocates thematic learning (which was discussed earlier in this paper), project-based integration, and literature-based integration.

A required book for another section of elementary science methods at CSU Dominguez Hills is *The Piaget Primer* by Ed Labinowicz, an education professor at CSU Northridge. Labinowicz, like other constructivist student-centered partisans, does his best to caricature teacher-centered methods, saying, for example, that they encourage passivity in students, are geared only to lower-order knowledge and skills, and foster mindless conformity and obedience among students. In contrast, Piagetian techniques develop "abilities and attitudes basic to the survival of a free society and the improvement of the quality of life."[236]

What is the Piagetian theory of learning? According to Labinowicz, children's learning sequence is "based on the natural, 'illogical' strategies children have been observed to employ..."[237] Different learning strategies are encouraged "so that chil-

dren become aware of the contradictions in their isolated applications and can integrate them into a higher-order strategy."[238] Instead of moving from the least to the most difficult activity, the introductory activity may be the most difficult so as to encourage children "to consider and integrate all aspects of the problem and apply logical operations in its solutions."[239] Starting with the most difficult activity encourages students "to first get an overall view, then adjust their thinking."[240] Instead of small sequential learning steps, Piagetian learning occurs in steps of varied sizes.[241] The direction of learning is not linear and teacher-directed, but is directed by children's active construction of knowledge.[242] Instead of step-by-step learning which guarantees successful automatic responses from children, Piagetian theory values intellectual conflict, where children evaluate different strategies and solutions simultaneously.[243] Instead of immediate teacher feedback to student responses, "Feedback is received from the materials and the logical consistency of the child's internal constructions."[244] Thus, under Piagetian learning theory, Labinowicz says that:

> The child is in the driver's seat on a roller coaster of discovery having multiple overlapping tracks. The disequilibrium energizes his drive to reach the goal at a higher level.[245]

The child may be in the driver's seat, but that does not mean that he or she will enjoy or benefit from the ride. As Stone and Clements point out, starting at the more difficult application level, and worrying about basic skills and knowledge later, may cause students to become frustrated and discouraged.[246] The effectiveness of this sequence of learning, they say, "has not been demonstrated."[247]

How does Piaget inform teaching? While behavioral psychology says that it is possible to teach any subject to any child at any stage of development, Labinowicz says that the Piagetian position believes that "Basic notions are accessible to children 7–10 years of age, provided they are divorced from their mathematical expression and studied through materials that a child can handle."[248] This is the developmentally-appropriate view of learning. Labinowicz also says that under Piagetian methods, teacher-centered instruction is deemphasized while student-centered experiences (experiential learning) are stressed. He states that unlike the traditional behaviorist/teacher-centered view, which accepts only correct answers and does not accept wrong ones, under Piagetian approaches, "All responses are accepted and are related to the materials under study to extend understanding or to develop thinking process."[249] Student self-evaluation rather than teacher evaluation is emphasized.[250] Under Piagetian techniques, instead of just memorizing facts, students are intrinsically motivated to learn and develop understanding.[251]

Labinowicz disdainfully acknowledges that parents are not likely to support student-centered Piagetian methods. He notes that Piaget himself "identifies the role of parents as a major obstacle to the implementation of active methods."[252] Parents are obstructive because of "their identification with traditional methods as opposed to experimental ones in which their children serve as 'guinea pigs,' and their obsession with the fear that their children will turn out 'backward'." In other words, parents oppose Piagetian methods because they worry that under such methods their

children might not learn how to read and do math. Labinowicz quotes an especially condescending observation by Piaget, who says:

> Now the multiple activities of manipulation and construction that are necessary to assure the practical substructure for the whole of later learning seem to parents like a luxury and a waste of time, simply delaying that solemn moment waited for by the entire tribe when the neophyte will know how to read and to count up to twenty![253]

Imagine those horrid parents, only caring about inconsequential things such as literacy and numeracy! Labinowicz seems to think that literacy and numeracy are "prestigious skills" when he scornfully says that "Small groups of vocal parents pressure the schools to accelerate in children certain 'prestigious' skills, which they can flaunt before their neighbors, enjoying a moment of superiority."[254] Parental support of school reforms that stress basic-skill-and-knowledge acquisition is chalked up not to parental interest in wanting children to read, write, and do math well, but rather to "parental ego needs" which "have little to do with children's best interests."[255] Parents, therefore, must be instructed about the better education—the Piagetian education—that their children should receive.[256] Such contempt for parents shows the monumental arrogance of Piaget, Labinowicz, and the Piagetians. They believe they have the teaching Rosetta Stone, and if parents are standing in their way, then parents must be indoctrinated as well as their children.

Instead of step-by-step learning which guarantees successful automatic responses from children, Piagetian theory values intellectual conflict, where children evaluate different strategies and solutions simultaneously.

The trouble is, Piaget, Labinowicz, and the Piagetians do not hold the Rosetta Stone to learning. They say that they have a better method of teaching, but they don't have the evidence to prove it. The empirical research data from Brophy and Good, Rosenshine and Stevens, and others show that traditional behaviorist teacher-centered methods are better at increasing student achievement. Labinowicz admits that the classroom research data in support of Piaget and his methods are "scattered" and that "a conclusive body of supportive classroom research is lacking."[257] Conveniently, he says, "The goals of Piaget's active methods are long-term and involve behavioral changes that, at present, cannot be measured by traditional evaluative instruments."[258] Yet, despite this admitted lack of evidence, Piaget, Labinowicz, and the Piagetians want to force their ideas on parents and society. Again, this is nothing more than arrogance.

Unsurprisingly, student-centered approaches also influence classes on multiculturalism. The mandated text for the fall 2000 course on multicultural perspectives for teachers, which is required for both the multiple- and single-subject credentials, is *Beyond Heroes and Holidays* edited by Enid Lee, Deborah Menkart, and Margo Okazawa-Rey. The editors make no bones about their radical perspective:

> Our work is guided by the philosophy of critical pedagogy, pioneered by Brazilian educator Paulo Freire. This philosophy is grounded in the beliefs that (1) the purpose of education in an unjust society is to bring about



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> equality and justice, (2) students must play an active part in the learning process, and (3) teachers and students are both simultaneously learners and producers of knowledge.[259]

A key purpose of school, according to the editors, is to offer a "place where students can analyze the forces which maintain injustice and develop the knowledge, hope and strategies needed to create a more just society for us all."[260]

Much of *Beyond Heroes and Holidays* is the usual tirade about the ubiquitousness of white racism in schools and education. The editors say they want to expose racism in the curriculum, school activities, and school organization. They say that "Eurocentrist perspectives and methods and multicultural education are inherently in contradiction."[261] They are out to destroy myths such as "White men made our country's history" and that "Whites are at the center."[262] One of the editors says:

> Racism in action makes Whiteness a preferred way of being human. By Whiteness I am referring to the civilization, language, culture and the skin color associated most often with European-ness. Racism is reflected in a hierarchy in which beauty, intelligence, worth and things associated with Whiteness are at the top.[263]

School is where this "hierarchical arrangement of skin power is confirmed daily."[264] In other words, schools are infected with institutionalized white racism.

How do the editors propose to accomplish their task? They want to eliminate racism through "restructuring power relationships in the economic, political, and cultural institutions in society."[265] Students, teachers, and others "can learn to be anti-racist activists, developing the skills to work with others to create systemic, institutional changes."[266] They also say that "Everyone needs multicultural, anti-bias education in all educational settings," and that "Teachers and parents, as well as children, need to engage in multicultural, anti-oppression education."[267] In terms of teaching methods, teachers should "view children as active learners who learn from each other as well as from adults" and use "cooperative learning and participation in governance of their classroom as crucial components of educating for equality."[268]

What about basic knowledge and skills? One of the editors says that "we cannot afford to become so bogged down in grammar and spelling that we forget the whole story."[269] What is the whole story? According to the editor, students must be given the tools to prepare and defend themselves against "the onslaught of antihuman practices that this nation and other nations are facing today: racism, sexism, and the greed for money and human labor that disguises itself as 'globalization.'"[270]

*Beyond Heroes and Holidays* goes on for more than 450 pages with one author after another talking about aspects of white racism. Chapter titles include: "White Privilege: Unpacking the Invisible Knapsack," "White Privilege in Schools,"

"Distancing Behaviors Often Used by White People," and "White Racial Identity and Anti-Racist Education: A Catalyst for Change." Virtually no mention is made of the existence of racism on the part of anyone who is not white. Such racism is evidently impossible given that racism is defined as being a purely white phenomenon. Anyone who is not white is automatically assumed to be a victim of the all-pervasive white racism. Thus, multicultural education, where varied and diverse cultures are supposedly respected (including, one would think, white European culture), is, in reality, mainly an anti-white ideological training course.

*Beyond Heroes and Holidays* is almost wholly based on qualitative anecdotal data, with virtually no rigorous empirical evidence presented to prove that multicultural education is effective in meeting its own self-defined goals or any other goals. For example, one can assume that an outcome of properly implemented multicultural education would be various school and teacher practices that would lead to increased student achievement, especially among minority children. Yet, as Stone and Clements note, attempts by schools to address multicultural diversity have largely failed to produce achievement results:

> Despite any clear indication of what, if anything, about the environment may be responsible for some groups performing less well than others, schools are frequently stampeded into making changes and accommodations that generally presume that diversity has been insufficiently accommodated or welcomed. Changes in teaching, organization, funding, hiring practices, curricular content, faculty training, pupil assignments, and leadership are only some of the responses that have been undertaken and, in general, they have shown little systematic relationship to achievement.[271]

Multiculturalists, though, would argue that their vision of multicultural education has never been properly implemented, hence, the poor results. It is impossible and fruitless to argue against such a claim.

Even based on qualitative standards, multicultural education may be deficient. One contributor, who teaches a multicultural-education course on white racism, acknowledges that her approach "is not a panacea" and says, "I strongly suspect that many White students continue to regard it as an academic exercise, giving me what I want but not taking it very seriously."[272] Forget hard data, even by qualitative standards multicultural education may be inefficient and ineffective.

Further, in the book's readings, no effort is made to present any diversity of points of view on race. Opposition to race preferences is caricatured. Conservative authors like Thomas Sowell, Abigail Thernstrom, Walter Williams, Shelby Steele, Linda Chavez, and Ward Connerly are unrepresented. So, while some of the book's content may be useful, the Leftist anti-white bias is so overwhelming that any useful information is overshadowed.

## San Francisco State University

The reading for the fall 2000 course in curriculum and instruction in mathematics, a required class for the multiple-subject credential, is *About Teaching Mathematics* by

Marilyn Burns. Burns immediately shows where she stands in the math wars by quoting, at the beginning of her introduction, a 1989 document of the constructivist National Council of Teachers of Mathematics:

> Mathematics learning is not a spectator sport. When students construct personal knowledge derived from meaningful experiences, they are much more likely to retain and use what they have learned. This fact underlies teachers' new role in providing experiences that help students make sense of mathematics, to view and use it as a tool for reasoning and problem solving.[273]

It is of note that although it is still constructivist, the National Council of Teachers of Mathematics has recently revised its standards to call for greater emphasis on traditional basic computational skills and knowledge.

Burns disparages paper-and-pencil computational arithmetic exercises, saying that they do not mirror real life. She says that "There's no place in our schools for teaching arithmetic by focusing on computation in isolation from the problem situations that require those skills."[274] Arithmetic, she says, "must be taught in the context of problem solving so it can assume its proper role in providing tools to use for solving problems."[275] She also says that "There's no place for requiring students to practice tedious calculations that are more efficiently and accurately done by using calculators."[276] Instruction, she believes, "should not aim toward an answer-oriented curriculum," but toward one that values "reasoning processes."[277] Therefore, she calls for students to start on word problems first, rather than computation, which is a reversal of traditional approaches to teaching mathematics.[278] This fits the Piagetian notion of starting with the difficult activity first, rather than going sequentially from the least to most difficult activity. The task for teachers and the curriculum "is to provide motivating problems that spark children's natural curiosity and allow them to use, in a safe and supportive environment, the skills they'll need later."[279] The fact that students may be confused by word problems (especially if they are not skilled on basic computation) should be of no worry since, "Confusion is essential to the process."[280]

All of these observations are stereotypical of student-centered constructivism. Burns gives the back of her hand to arguments in favor of concentrating on basic computational skills. To the argument that slower students need more instructional time and practice in basic computational skills, Burns says no problem, simply have those students use a calculator. That those students may never learn to do arithmetic calculations by hand is acceptable because "there must be a redefinition of what is really basic to mathematics."[281] Yet, a September 2000 study by the Brookings Institution that analyzed test data from the National Assessment of Educational Progress found that fourth graders who used calculators every day scored lower than students who used the devices less frequently.[282] Also, Burns ignores the possible negative impact increased calculator use could have on low-socioeconomic-status students who benefit more from teacher-centered structure and drill and practice.

Burns also believes that parental objections must be dealt with in a Piagetian manner, since the world "differs greatly from when parents were in elementary

school."[283] Thus, "Professional educators have the job of reeducating parents, not just complying with demands that are obsolete."[284]

What about potential student frustration with problem solving? Student attitudes must be realigned so they accept the risk of being wrong, accept frustrations that come from not knowing, persevere when solutions are not immediate, and understand the difference between not knowing an answer and not having found it yet.[285] In order to establish this realignment, Burns says:

> Teachers need to emphasize the importance of working on problems, not merely on getting the right answer. Errors should be viewed not as unfortunate mistakes but as opportunities for learning. The classroom should be a safe place in which new ideas can be tried out and in which children can feel free to risk making mistakes.[286]

In verifying children's work, teachers should emphasize student self-verification. This may seem hard, but Burns says that in real life:

> There is not necessarily one correct solution to real problems. At times, several possible solutions exist. Often, an exact solution isn't even required and being close enough is sufficient. Most important, in real life, it's up to the problem solver to decide when a solution is "right" or "best." In light of those issues, providing answers does not enhance students' critical thinking skills.[287]

To the argument that slower students need more instructional time and practice in basic computational skills, Burns says no problem, simply have those students use a calculator.

In order to maximize problem solving, Burns recommends cooperative learning through group activity. She admits, though, that there is no guarantee of instant success from this method because, among other things, children often are not cooperative.[288]

As pointed out earlier, the methods advocated by Burns are at odds with much empirical research. To review, Chall says, "What the research has found is that those who learn basics early do better in reading and math—on tests of basic skills and ultimately in problem solving."[289] Rosenshine and Stevens found that "When young students are expected to learn on their own, particularly in the early stages, the students run the danger of not attending to the right cues, or not processing important points, and of proceeding on to later points before they have done sufficient elaborations and practice."[290] For improved student achievement, they found that repeated practice of basic skills results in automatic recall of basic knowledge and has a positive impact on higher-order thinking: "When prior learning is automatic, space is freed in our working memory, which can be used for comprehension, application, and problem solving."[291] Hirsch also says that empirical research does not support problem-solving-based mathematics teaching methods:

> Just as in the case of reading, where it is considered harmful to submit children to the deadening process of directly learned letter-sound corre-



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spondences, it is considered equally harmful to submit children to the "drill and kill" process of learning the number facts of addition, subtraction, and multiplication by heart. No, say American experts, children will learn better if they discover the truths of mathematics for themselves, naturally by solving "real-world" math problems when they are developmentally ready to solve them. [Psychologist and researcher] David Geary, in an important series of studies, has shown that the psychological and developmental assumptions behind these naturalistic dogmas are as incorrect in mathematics as they are in reading, and lead to equally poor results.[292]

Geary, like Rosenshine and Stevens, found that problem-solving skills in mathematics significantly depend on automatic recall of prior rules, skills, and knowledge:

> More specifically, automation refers to the automatic execution of a procedure without having to think about the rules governing the use of the procedure. One of the benefits of rule automation is reduction in the working-memory demands associated with using the procedure. The freeing of working-memory resources makes the processing of other features of the problem easier and less error-prone.[293]

It should also be noted that, despite Adams and Hamm's scorn for computational skills, California's tough new mathematics content standards are computationally oriented.

In order to achieve the critical thinking that Burns and other student-centered constructivists seek, Hirsch says that, "expertness in the skill depends upon automation, through a great deal of practice, of the repeated, formal elements of the skill, thus freeing the conscious mind for critical thought."[294]

Burns also admits that there is some justification in the criticism that the problem-solving method is too time consuming and inefficient:

> Time is often a concern for teachers—they've got just a year to teach an enormous amount of material. Natural learning, however, doesn't happen on a time schedule and often requires more time than schools are organized to provide. Problem-solving experiences take time. It's essential that teachers provide the time that's needed for children to work through activities on their own and that teachers not slip into teaching-by-telling for the sake of efficiency.[295]

In other words, problem-solving may be inefficient and may lead to children not learning all that they are expected to learn, but teachers should engage in the method anyway.

Also at San Francisco State, the fall 2000 seminar course on classroom observations mandates *New Designs for Teaching and Learning* by Dennis Adams and Mary Hamm. The Adams and Hamm book has been extensively discussed previously in this paper. The authors favor critical-thinking methods, cooperative learning, and

student-centered assessment devices such as portfolios of student work. Despite the fact that much empirical evidence shows that teacher knowledge of subject-matter content is critical to student achievement, Adams and Hamm say that "Content knowledge is not seen to be as important as possessing teaching skills and knowledge about the students being taught."[296] Rather than content knowledge, "successful teachers understand the outside context of community, personal abilities, and feelings, while they establish an inside context or environment conducive to learning."[297]

In subject areas, Adams and Hamm favor a whole-language approach to reading instruction. In science, they argue for a constructivist view of science learning, for cooperative-learning methods, and for thematic learning. In math, they strongly support the student-centered problem-solving method favored by Burns:

> Mathematics in the 1990s emphasizes connections and relationships; it is seen as a process or a journey with the student in the role as the explorer. Constructing a hypothesis, engaging in problem solving, and participating in group investigations must replace traditional chalk-talk and textbook methodologies. Whereas in the past, the emphasis was on how to answer questions correctly or memorize facts, the challenge for today's teachers is how to motivate students for the lifelong learning of mathematics, awakening mathematical curiosity and encouraging creativity.... To make mathematics accessible and interesting, today's best mathematics teaching derives mathematics from each learner's reality, emphasizing inquiry and valuing students' ideas. Mathematics is as much cooperative purpose and storytelling as it is formulas and calculations.[298]

As has been shown, though, there is no rigorous empirical evidence for Adams and Hamm's views. It should also be noted that, despite Adams and Hamm's scorn for computational skills, California's tough new mathematics content standards are computationally oriented. New teachers who are influenced by the opinions of Burns, Adams, and Hamm are likely to have less success in getting their students to meet the state's math standards.

## CSU Fresno

At CSU Fresno, the book *Theme Immersion* by Maryann Manning, Gary Manning, and Roberta Long, discussed at length earlier in this paper, is the required reading in the multiple-subject-credential course on integrated curriculum. In theme immersion, students and teachers plan the in-depth study of a topic, issue, or question. Besides explaining the idea and process of theme immersion, the Mannings and Long also profile supposedly successful examples of theme immersion.

One such example involves Linda Maxwell, a fourth-grade teacher in Alabama. Her students, after much discussion, voted to study the environment. After more discussion, the students came up with six subtopics ranging from saving the rainforest to endangered animals. Ms. Maxwell set aside a certain part of the day for work on the theme-immersion project. A dedicated environmentalist, Ms. Maxwell

contributed her large store of articles and books on environmentalism. Eventually, students wrote a tree ordinance for their city and a planet bill of rights, and painted pictures and built models of rainforests.[299]

While students in Ms. Maxwell's class certainly gained some skills and knowledge, it is easy to see that, despite the supposed emphasis on selecting a wide range of resource materials, theme-immersion learning can be very one-sided. From Ms. Maxwell's description, the resource materials used by students, including the one's supplied by her, were heavily weighted to an environmentalist point of view. There is no indication that elementary issues of economics such as supply and demand and cost-benefit analysis were ever brought up. When the children wrote their tree ordinance, which required developers to replant as many trees as they cut down or face a per-tree fine, no mention was made of the increased costs this would impose upon business and consumers. There is also no indication that issues such as jobs versus environmental preservation were addressed. Although Ms. Maxwell says that she wants her students to develop higher-order thinking, it is hard to see how one-sided projects will truly cause students to think critically.

The response to this criticism may be that Ms. Maxwell's specific project was flawed for not including some economic considerations. This flaw might be remedied by including such considerations in a future project, and ensuring a balanced set of resource materials as a general rule. Yet, remember the views of Peter McLaren, Paulo Freire, and other advocates of student-centered practices. For these people, student projects must be one-sided since the goal is not to gain balanced knowledge but to advance leftist ideas of social change. Seen in this light, thematic immersion can be a tool to implement this agenda.

Theme immersion may help students with certain skills and give them some new knowledge, but the number of such skills would likely fluctuate significantly from situation to situation. And a measurement of added value to projects would be difficult. The watchwords with thematic immersion, then, are caution and prudence. While allowing for its potential positive aspects, Hirsch gives some warning:

> As with various forms of the "project method," however, thematic learning has proved to be more successful when used with prudence as an occasional device than when used consistently as the primary mode of instruction. One reason for entering this caution is that some subjects require different amounts of exposure than others in order to be learned. History and literature, for example, generally require fewer reinforcements to achieve a learning goal than do certain aspects of math and science, whose procedures must be often repeated and practiced. The thematic approach may or may not provide these needed reinforcements. As with most pedagogical methods, the key is common sense.[300]

Constructivist books adorn many reading lists at CSU Fresno. *Literature for the 21st Century* by Gail Tomkins is required for literacy development in early development and elementary classrooms, a multiple-subject-credential course. Tomkins says, "I have based the text on four contemporary theories of literacy learning: construc-

tivist, interactive, socio-linguistic, and reader-response theories."[301] *Teaching Strategies: A Guide to Better Instruction* by Donald Orlich, Robert Harder, Richard Callahan, and Harry Gibson is required in one section of curriculum and instruction in elementary schools, a multiple-subject-credential course. The book is based on holistic instruction, which is similar to thematic learning and project-based learning.[302] *Curriculum and Instructional Methods for the Elementary and Middle School* by Johanna Lemlech is required in another section of curriculum and instruction in elementary schools. Lemlech says:

> Constructivist learning necessitates that students are perceived as active partners in framing the learning process. New understandings about how we learn have emphasized that knowledge is individually constructed and reconstructed … No longer can teachers expect to be fountains of wisdom and convey knowledge to passive students. Rote learning of skills and total reliance on the textbook are out of step with the information age, an interdisciplinary curriculum and higher order thinking.[303]

Theme immersion may help students with certain skills and give them some new knowledge, but the number of such skills would likely fluctuate significantly from situation to situation.

## CSU Sacramento

A required book in the course on elementary-school social-studies instruction is *Social Studies and the Elementary School Child* by George W. Maxim. Maxim states that he believes that no one instructional method achieves the goals of social studies.[304] Yet it is clear that he favors student-centered approaches.

For example, he includes a discussion of Howard Gardner's theory of multiple intelligences. According to Gardner, instead of a single intelligence, people have seven different types of intelligence including: logical-mathematical, verbal-linguistic, musical-rhythmic, visual-spatial, bodily-kinesthetic, interpersonal, and intrapersonal.[305] According to Maxim, "Elementary school social studies teachers attempt to make use of as many of these intelligences as possible in the activities they select for their students."[306] Using these categories allows each child to "experience success in ways that build on individual strengths and also encourages strengths in new areas."[307] Gardner's categories are tailor-made for the student-centered view that each child has an individual learning style.

There is little empirical support, however, for Gardner's categories. Eminent psychologist George Miller, writing in the *New York Times Review of Books*, concluded that "Since none of the work has been done that would have to be done before a single-value assessment of intelligence could be replaced by a seven-value assessment, the discussion is all hunch and opinion."[308] Hirsch asks:

> Should schools develop a student's special talent and style of learning at the expense of developing standard academic competencies such as reading, speaking, mathematics, and general knowledge? Research cannot



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> answer that question. Should everyone get an A for something? That is a question of social policy that does not find an answer in research. Equity, however, clearly requires that schools give all children the knowledge and skill they need to become politically functional, economically successful, and autonomous citizens. If schools do not define with some particularity what those attainments are, and if they do not cause every student to reach them, no amount of overt concern for individuality can enable each student to develop his or her potential as a participant in the larger society.[309]

Maxim, like other student-centered partisans, dislikes standardized tests. He quotes the usual gaggle of professional education associations that claim that standardized tests rely on rote memorization, do not accurately reflect real abilities, are not associated with real-life experiences, and do not measure higher-order thinking.[310] It goes without saying that he does not include the views of testing experts who refute all these points.

Maxim says that clear criteria for making judgments must be used and made clear to students. Teachers are also asked to write descriptive reports of students' activities.

Rather than standardized tests, Maxim prefers student-centered authentic assessment. According to Maxim, "authentic assessment is based on major sources of information: real-life tasks and teachers' observation."[311] Such assessments ask students to "do something, make something, offer solutions to problems, or compose a critical response to an issue."[312] These assessments may take the form of "written products, demonstrations, group projects, integrated art and music activities, construction projects, dramatizations, museum displays, and so on."[313] Maxim says that clear criteria for making judgments must be used and made clear to students. Teachers are also asked to write descriptive reports of students' activities.

While many of Maxim's "authentic assessments" are also recommended by those supporting teacher-centered practices, the question is one of balance. Proponents of student-centered approaches would like to eliminate objective and standardized tests, while those supporting teacher-centered methods advocate using both objective tests and authentic assessments. The problem with using authentic assessments exclusively is that they are more subjective and there isn't always a guarantee that they will indicate whether a student has acquired necessary knowledge and skills. Stone and Clements point out that authentic assessments "can be superficial and misleading, and assessments based on them can overlook important aspects of learning."[314] They go on to say:

> In fact, successful performance under authentic conditions may or may not represent a grasp of critically important knowledge and skills. For example, if students working in a cooperative group successfully repair an automobile, their performance may seem to demonstrate that they are able to read a repair manual and order parts correctly. In truth, it may indicate only that they are able to follow the advice of a knowledgeable friend or parts store clerk.[315]

Conventional objective tests, say Stone and Clements, more accurately measure the ability of students to decode symbolic and abstract information, interpret communication and understand the message, and understand the question and know the relevant information.[316] Citing empirical evidence, Stone and Clements note that traditional testing is effective, free of unwanted negative consequences, and meets established and reasonable psychometric criteria of validity, reliability, and freedom from bias.[317] Which is why, they say, "If schools are to be accountable for both conventional and application-level outcomes, both types of assessments are needed."[318]

Maxim also advocates constructivist teaching, saying that "Constructivists reject the traditional 'toss-and-catch' approach to instruction, where teachers cast out knowledge to the children and expect them to snare it and commit it to memory."[319] Maxim says his book is constructivist and heavily influenced by Piaget and Vygotsky.[320]

Maxim observes that Piaget believed that higher-order thinking is based on problem solving. He, therefore, recommends various problem-solving strategies. However, like many other student-centered enthusiasts, he admits that problem-solving approaches are slow and time consuming.[321]

Finally, Maxim supports cooperative learning. He says that cooperative learning gets competition out of the classroom. He uses the usual canard of claiming that in the competitive classroom the majority of students is labeled as "losers."[322] In contrast, under cooperative learning, "youngsters are able to participate together as members of a social community focused on the common task of achieving shared learning goals."[323]

## Sonoma State University

In program documents prepared for the California Commission on Teacher Credentialing (CTC) in 1998, Sonoma State University included descriptions of the objectives of a number of its courses. Many of these course objectives are clearly student centered.

For the course on teaching mathematics in elementary schools, the first course objective is, "To demonstrate an understanding of theories of constructivist learning and cognitive development, their implications for teaching mathematics to elementary school children, and their relevance to individual differences among learners."[324] The course also emphasizes "problem solving, small group work, use of manipulatives, communication skills, concept development, and integration across content areas."[325] Prospective teachers are to make sure that instruction is "developmentally appropriate and interesting for target students."[326] They are also to "involve students actively in the learning process."[327] Another course goal is, "To explain the various goals of authentic assessment in mathematics teaching, and describe various techniques for assessing students fairly in ways that take account of student diversity."[328]

A key objective for the course on teaching science in elementary school is, "To understand children's intellectual development, especially from the perspective of the neo-Piagetians, in the context of developmentally appropriate pedagogy; to understand various science teaching approaches in terms of their developmental appropriateness."[329]

A top goal in the course on integrated curriculum in elementary schools is, "To explore curriculum models that employ cooperative learning, multiple ability groupings, constructivist learning opportunities, and literature-based curriculum."[330] Another objective is, "To explore curriculum models that increase the ability of students to integrate information, evaluate, and problem solve."[331]

## CSU Los Angeles

At this point, it is worth saying a few words about reading instruction. The CSU schools of education appear to be somewhat schizophrenic about how to teach reading. For example, some courses for graduate students in education have required readings that emphasize whole-language reading instruction, while other courses stress phonics methods.

According to Chall, whole-language approaches are student-centered, rely more on children's choice of the reading materials, prefer children's literature to textbooks, and teach phonics incidentally, if at all.[332] Much evidence shows that phonics-reading instruction, which emphasizes letter-sound relationships, is more effective in teaching reading to younger children than whole-language methods.[333]

A graduate course on the reading cognitive process at CSU Los Angeles requires the text *Reading Process and Practice* by Constance Weaver. The Weaver book is subtitled, "From Socio-Psycholinguistics to Whole Language." Although she gives a nod to phonics instruction, Weaver is a whole-language partisan and a self-proclaimed adherent of critical theory.[334] In addition to her technical arguments in favor of whole-language instruction, Weaver accuses supporters of phonics as being, in many cases, members of the religious and political far right. She believes that the far right supports phonics because it promotes the authority of home (i.e., parents) and the church, and also promotes docility and obedience of the lower classes.[335] Heavy phonics instruction "trains students to be passive and obedient" and "contributes to maintaining the unequal distribution of money and power among different social and ethnic groups."[336]

However, other classes at CSU Los Angeles do instruct students in phonics-reading methods. In the fall 2000 course on curriculum and teaching reading, the required text is a pro-phonics work entitled *Phonics in Proper Perspective* by Arthur Heilman. Heilman blasts whole-language methods saying:

> Whole language is the latest version of that magnificent obsession that children might be successful in reading literature prior to solving the written code. What sustains this recurring dream? Is it based on the fact that learning the code is not a totally pleasant experience? Adult critics have noticed this as they observe children learning to read. When these adult, expert readers read, they are immersed in and sustained by the power and beauty of language. They say, 'Let beginning reading be like this. Let beginning readers become involved with the beauty of language that resides in literature.' To believe that this can occur, it is necessary to blur the difference between reading and learning to read. However, reading and learning to read are not synonymous. Learning to read is the price we pay in order to read literature.[337]

Heilman says that once children have mastered the written code through the use of phonics, they can solve the identity of most unfamiliar words.[338] Heilman then describes various phonics teaching strategies.

Other CSU schools of education also include pro-phonics texts in their courses. CSU Sacramento, for example, requires several pro-phonics works, including *Phonics for the Teaching of Reading* by Marion Hull and Barbara Fox.[339] The inclusion of such pro-phonics texts, which is a relatively new phenomenon, indicates the influence of California's pro-phonics reading standards, statewide standardized tests, and the functional illiteracy of so many California children, especially those in poor urban schools. While this paper has criticized the student-centered orientation of the CSU schools of education, the increase in phonics instructional books on CSU reading lists is commendable and should be recognized.

# Part 3 — Models for Reform: Singapore, Kumon, and Nancy Ichinaga

This section of the paper looks at various teacher-centered approaches that have proven successful in improving student performance.

## Singapore

In international comparisons of mathematics learning, students from Singapore lead the world in achievement.[340] In the recently-released *Third International Mathematics and Science Study-Repeat*, Singapore's eighth graders ranked first in math achievement and second in science achievement.[341] Why do Singapore students do so well? Much of the reason has to do with the teaching methods employed by educators in Singapore.

The Singapore mathematics curriculum for grades one through six, which uses grade-level work books and teacher guides, is based on practices that would make many student-centered enthusiasts uncomfortable. For example, in the first grade teacher's guide, after students are familiarized with the concept of addition, two methods of computing are outlined, but in each, teachers are requested to have their students memorize arithmetic facts within a given range, such as numbers from one to 10. For example, for one of the methods, teachers are told:

> At this stage, the pupils are encouraged to commit the addition facts within 10 to memory for quick recall. Some pupils can memorise these number facts quickly and easily by drill alone. Others may need additional help through carefully planned schemes and structured activities.[342]

Later, students are also "expected to memorise the subtraction facts within 10 for quick recall."[343] Word problems, games, and picture cut-outs are used in both addition and subtraction, but their purpose is to help illustrate the memorized arithmetic facts. As mentioned earlier in this paper, the quick recall of prior learning (automaticity) is crucial for new learning.

Word problems, games, and picture cut-outs are used in both addition and subtraction, but their purpose is to help illustrate the memorized arithmetic facts.

In the Singapore curriculum, the learning is based on small step-by-step increments. Thus, once students "have mastered



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the addition facts and subtraction facts within 10," then "The next step is to master the basic addition facts within 20." Once again, teachers are advised that:

> Some pupils can memorise number facts quickly and easily by drill alone. Others need a lot of practice and reinforcement. The use of thinking strategies will enable the pupils to figure out the correct answers for the number facts and gradually commit them to memory.[344]

Notice that Singapore emphasizes getting the correct answer and committing those correct answers to memory. Much practice is urged for poorer-performing students. The recommended thinking strategies are mental calculation strategies, such as using the number 10 to make adding and subtracting easier. Again, Singapore recommends practice for these thinking strategies, saying that, "pupils need to practice the use of these strategies" in working out number facts so that they can then commit the facts to memory.[345] Mental calculation strategies are emphasized throughout the Singapore curriculum.

Memorization, automaticity, and quick teacher feedback are important features of the Singapore method.

First-grade math gets incrementally more difficult: addition and subtraction within 40, subtraction within 100, and introducing the concepts of multiplication and division. In the second grade, formal addition and subtraction using vertical columns of numbers is introduced. This incrementalism characterizes the entire Singapore curriculum.

New knowledge is built upon previously learned knowledge. So, for example, in the fifth-grade lesson on measuring angles, the teacher's guide notes that "In Primary Four [i.e., the fourth grade], the pupils learnt to measure and draw angles in degrees with a protractor."[346] The guide says that students "should know" the number of degrees in a right angle, two right angles, three right angles, and four right angles. Based on this prior knowledge, an 8-point compass is introduced and teachers are to demonstrate to pupils "that the angle between any two adjacent points is 45 degrees."[347] Regarding work with decimals, the fifth-grade guide says that "In Primary Four, the pupils learnt to round off decimals to the nearest whole number and to 1 decimal place."[348] Based on this prior knowledge, "These concepts are extended here to rounding off decimals to 2 decimal places."[349]

Memorization, automaticity, and quick teacher feedback are important features of the Singapore method. In the second grade, multiplication tables are introduced. Teachers should, "Encourage the pupils to commit the multiplication facts to memory."[350] To do this, teachers should, "Use flash cards to provide frequent practice on mental calculations."[351] Specifically, teachers should, "Show the front of a [flash] card, get the response from the pupils, then show the back of the card to give immediate feedback to the pupils."[352] The same requirements and procedures are laid out for division as well. Such instructional activities would please Rosenshine and Stevens.

While constructivists hate competition, Singapore has no aversion to competitiveness among students. For example, games using the flash cards are recommended so

that students can recall multiplication facts. In one game which has two to four players, a student points to a flash card, says the answer to the multiplication problem on the card face (e.g., 5 x 2) and then turns the card over to check the answer. If a player gives the correct answer, he or she keeps the card. If the player gives an incorrect answer, the card goes into a discard pool. When all the cards are used up, the discarded cards are shuffled. According to the second-grade teacher's guide, "The player who collects the most cards is the winner."[353] The concept of winning, therefore, is used as an incentive for all students to master important knowledge and skills.

Also, whereas constructivists admit that their methods are slow and time-consuming, and force students to contend with the frustration of not getting a "correct" answer, Singapore encourages speed and accuracy:

> The use of mental calculation strategies in computation will encourage flexibility in thinking and develop a stronger number sense. The emphasis is on mathematical thinking and computation processes. It will also help to improve speed and accuracy.[354]

Flash cards are used so that students can practice mental calculation strategies in order arrive at correct answers swiftly. In an exercise-game on division, each student in a group is given a worksheet that contains division sums. The pupils within the group then "compete for speed and accuracy."[355]

The importance of getting the correct answer is constantly reinforced throughout the Singapore curriculum. Whereas constructivists say that it is acceptable for students to get "wrong" answers and to mull at length over these answers without much input from teachers, Singapore tells its teachers that "It is important that the pupils' mistakes be analyzed and rectified immediately."[356]

It is also interesting to note that whereas constructivists like to use "real-life" projects to introduce concepts such as area and perimeter, Singapore's teacher guides rely on classroom work to demonstrate these concepts.[357] Also, Singapore uses flash cards as a classroom tool, not just in the early elementary grades, but into the later elementary grades as well. For example, in the sixth grade, flash cards of fractions are used in teacher-led exercises to get students to express a fraction as a percentage.[358]

Also, in contrast to American constructivists who want students to guide the learning process, in Singapore it is definitely the teacher who is in control. The Singapore teacher guides are laced throughout with statements that teachers should "lead," "teach," or "guide" their pupils. For example, teachers should, "Lead the pupils to see the relationship between decimals and fractions."[359] Teachers should, "Lead the pupils to see that 0.8 is another way of writing 8/10."[360] In discussing the addition and subtraction of decimals, teachers should, "Teach the pupils to even out the number of decimals places by inserting a decimal point and zero (or zeroes)."[361] In teaching long multiplication, teachers should, "Guide the pupils to carry out the algorithm for multiplication of a 4-digit whole number by a 2-digit whole number."[362] Even when students are doing word problems, which constructivists say are vehicles for student exploration, Singapore injects the teacher. In a sixth-grade lesson on speed, distance, and time, teachers are asked to, "Guide the pupils to solve multi-step word problems

with the help of a diagram."[363] Students are not to discover these things on their own, but are to be taught, led, and guided by their teacher.

As Stone and Clements have noted, cooperative learning should be balanced with individual learning. Singapore seems to maintain that balance. While there is much individual learning, there are cooperative activities as well. For instance, in a sixth-grade exercise on percentages, students are given a word problem and asked "to solve the problem cooperatively."[364]

In sum, the teaching methods recommended by Singapore's teacher guides are much more traditional and teacher-centered than the methods advocated by the CSU schools of education. The fact that these methods have been a significant ingredient in Singapore's top academic rankings should pique the interest of educational policy-makers here in California. The Gabriella and Paul Rosenbaum Foundation, based in Chicago, is currently in the process of introducing the Singapore math curriculum to U.S. school districts.[365]

## Kumon

Kumon is the most popular afterschool academic program in the world. More than 2.6 million students in countries around the world attend Kumon classes.[366] In the United States, there are currently more than 1,300 Kumon centers.

All these centers use the Kumon Method of learning which was developed over 40 years ago by Toru Kumon, a high-school mathematics teacher in Japan whose son was struggling with second-grade arithmetic. According to the Kumon website:

> As an educator, Mr. Kumon realized that a strong foundation in the basics was needed for success in higher level math. With that in mind, Toru Kumon created a series of worksheets for his son to do after school. Through daily practice and a commitment to mastering each concept, his son was able to solve differential equations and integral calculus problems by the time he was in the sixth grade.[367]

The Kumon method is extremely popular with parents because it is based on a traditional view of learning. The following is a summary of the key components of the Kumon method:

- *Individualized learning*. The Kumon method allows students to work at a level and pace that is most suitable for them.
- *Independent learning*. The Kumon method allows students to progress smoothly as the level of difficulty gradually increases. Students learn to depend on themselves.
- *Comfortable starting point*. Students are given a diagnostic test to determine their comfortable starting point. This determination allows for immediate success and building of confidence.
- *Curriculum*. The material to be learned is organized in a naturally coherent, logical progression. It is an incremental step-by-step curriculum.
- *Repeated practice*. As students strive to develop speed and accuracy to

achieve mastery of their assignments, repetition of materials is a perfectly normal part of the process and is, in fact, an important tool. The amount of repetition will vary depending upon the needs of the individual student.

- *Mastery*. Mastery goes well beyond just knowing or understanding; it is considered to be the point of total comprehension that lets one apply a skill with confidence. To measure mastery, Kumon assesses in two areas—speed and accuracy. Accuracy is observed by the number of correct answers per worksheet, and speed is assessed by comparing the student's elapsed time for completion of an assignment against a pre-established measure.
- *Advanced level of study*. Kumon's goal is for all students to attain advanced student status as early as possible. The benefits of such status include: excellent study skills, self-confidence, an academic head start, superior problem-solving ability, capacity for independent study, and high achievement regardless of age or grade level.[368]

As one can see, many of the elements of the Kumon method fit the model of student achievement outlined earlier in this paper. For example, the Kumon method is incremental and based on practice. Kumon says that it takes, "One small step at a time."[369] In the Kumon math curriculum, there are 552 steps, from counting to college-level mathematics. There are 10 worksheets per step, totaling 5,520 in all. Under this method:

> The path to advancement is made even smoother by the focus on repetition. This focus gives children the same or related problems repeatedly until they can get the correct answers quickly and effortlessly.[370]

Repetition and practice, as has been discussed throughout this paper, are significant factors in improving student achievement.

Repetition and practice, as has been discussed throughout this paper, are significant factors in improving student achievement.

Of course, American constructivists would be appalled by such methods. CSU education professors would shudder at the possibility of Kumon-like methods being used in California's public-school classrooms. Yet, millions of parents worldwide spend their hard-earned wages on Kumon programs for their children. These parents are making a choice based on the belief that the Kumon method will help their children succeed. No doubt many other parents would send their children to Kumon or Kumon-like classes if they had the means to do so. That Kumon is becomingly increasingly popular in the United States is an indication not just of the results it brings, but of the teaching failures in our public schools.

## Nancy Ichinaga and Bennett-Kew

That differences in teaching practices do have a significant impact on student achievement can be seen at Bennett-Kew elementary school in Inglewood, California. Students at Bennett-Kew are mainly minority and come from low-income families.



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Many are also limited-English-proficient. These are just the types of students who tend to do poorly on achievement indicators. Yet, Bennett-Kew students perform well on state achievement tests and the school has been recognized nationally. A key reason for Bennett-Kew's success lies in its commitment to teacher-centered teaching methods and a teacher-centered curriculum.

In an interview with the authors of this paper, Nancy Ichinaga, longtime principal of Bennett-Kew and recently appointed member of the California State Board of Education, was quite frank about her views on teachers, teaching methods, and teacher training. She said that the emphasis of teacher-training coursework on pedagogy rather than on the content knowledge that teachers must impart to students—the "how" versus the "what"—is detrimental:

A key reason for Bennett-Kew's success lies in its commitment to teacher-centered teaching methods and a teacher-centered curriculum.

> A lot of the courses are in how to teach, not what to teach. So until the schools of education get clear as to what to teach, or at least give them a framework, a syllabus for what should be taught for grade level, [prospective teachers] will never know. And they always talk about how to teach.... And different techniques of how to reach kids. They're all "how." Cognitive learning, collaborative learning, clinical instruction, they're all "how." They're not about "what." Until you get a clear idea of what it is you have to teach, the how doesn't make any sense, it just floats away. So teachers use these different techniques, but they really don't have an objective. Their objective would be to get kids to work cooperatively. They're not academic. That is the major problem with teacher education.[371]

In other words, the objective should not be the process of teaching, but instead the content knowledge that students need to master. It comes as no surprise that Ms. Ichinaga proudly says, "I'm a fan of E.D. Hirsch."[372]

Ms. Ichinaga also sharply criticizes schools of education for their Piagetian belief that students should learn the whole before learning the basic component parts. For Piagetians, step-by-step learning is an anathema that harms children's curiosity and their interest in learning. Ms. Ichinaga, though, says that it is Piagetian methods which are truly harmful:

> I've always been a behaviorist. You teach everything, which includes the literature but also the basic skills. Whereas the Romanticists think that if you teach the whole, the details will take care of themselves, I believe that you have to teach children step by step before the whole is developed. You don't [teach] the whole and expect everything to be filled in just because you do the whole. But if you do the step by step, the whole eventually takes place as a natural phenomenon.[373]

Ms. Ichinaga also blasts schools of education for their emphasis on discovery learning and other constructivist teaching methods. She says that these teaching practices have a harmful effect, especially on low-income students:

> As long as the universities are full of these people who believe that the best way to teach is to get the kids to do things and to learn by doing, to learn by discovery and not by the teacher teaching them, you have a problem. And the thing is, with affluent people you get by, but the poor kids do not get by.[374]

Ms. Ichinaga points out that children from affluent backgrounds have a strong educational support network of parents and tutors, while poor children do not. Affluent children may succeed in spite of bad teaching methods, but poor children will not.

What curricula does Ms. Ichinaga use at Bennett-Kew? She uses Open Court, the teacher-centered phonics-oriented reading program, and Saxon math, the teacher-centered math program that emphasizes practice and basic computational skills. These curricula, she says, have much to recommend them:

> Because our curriculum is set, it's easy to instruct [new incoming teachers] on what to teach. We use curricula, the Open Court and the Saxon math, which are very scripted. So if the teachers follow the script and the pacing that both series have, then the teachers learn how to teach as they teach.[375]

Despite the ease of teaching with Open Court and Saxon, Lorraine Fong, vice principal at Bennett-Kew, says that they have more trouble with teachers who have gone through the regular credentialing programs at the schools of education. These teachers "don't agree with some of the ways to do things," and, worse, "They think they know better."[376] To avoid this I-know-better attitude, Ms. Ichinaga says that "In the last few years, 90 percent of the people I've hired have been emergency credentialed teachers."[377] This means, says Ms. Ichinaga, "no teacher training."[378] Mincing no words, she further states:

> The teachers who have gone through the credential programs at the colleges come with baggage. They think they know better because they've been brainwashed and those are the teachers with whom we have trouble. There is resistance from them.[379]

She then contrasts her methods versus those taught at the schools of education:

> It's not a mystery. [Bennett-Kew teachers] know exactly what it is they have to teach. They know exactly what kind of academic achievement must be expected from the kids. And so they meet these. The problem with the colleges is that they will not tell [prospective teachers] what to teach.[380]

Whereas many educators have decried California's new academic content standards as being too tough and too prescriptive in terms of the knowledge students are required to gain, Ms. Ichinaga fully supports the standards. She opposes constructivist programs such as integrated math and hands-on science learning, not only

because they are ineffective, but also because, in many instances, they do not meet the state standards. She also strongly criticizes the fact that teacher-training courses are not aligned with the state standards. She believes that the schools of education have no intention of aligning their courses to the standards "because that goes against their grain and their philosophy."[381]

Finally, while constructivists oppose testing, Ms. Ichinaga embraces testing. Under the curricula at Bennett-Kew, students are tested periodically. This is necessary to chart the progress of students (Ms. Ichinaga keeps the charts in her office). Knowing exactly how students are doing allows Ms. Ichinaga to find out if specific students are having problems and if specific teachers need to improve.

Throughout her career, Nancy Ichinaga has been fearless in bucking the fads and trends in education. Her clear-eyed common-sense views on teacher training should be heard by all Californians. In her new position, as a member of the state Board of Education, she will, one hopes, have an opportunity to turn her views into major policy reforms. That is a prospect that should gladden the hearts of parents and the public.

# Part 4 — How To Improve Teacher Training

## Conclusions and Recommendations

This paper has presented background information on the debate over student-centered versus teacher-centered teaching methods. Descriptions of the major theories and theorists have been included. Empirical evidence on the comparative effectiveness of the various methods has been weighed. The positions of a sampling of CSU schools of education have been gauged based on university documents and required readings in education courses. Alternative teaching systems have also been examined. Based on all these discussions, this paper concludes that teacher-centered teaching methods are more efficient and effective than student-centered methods in improving student achievement and that the CSU schools of education, despite the evidence, still mainly push student-centered methods on their students. Indeed, little effort seems to be made at the CSU schools to give prospective teachers a choice of teaching methods.

That much of California's teaching force has been indoctrinated in less effective student-centered teaching methods is likely a significant factor in the low achievement of California students. As studies by William Sanders and June Rivers have documented, consecutive years of ineffective teachers have a large negative impact on the achievement of students.[382]

What to do? First there must be a philosophical shift in our view of teaching practices. Progressive student-centered ideology has damaged the academic progress of generations of American students. As Hirsch observes, "We cannot afford any more decades dominated by ideas that promote natural, integrated project-learning over focused instruction leading to well-practiced operational skills in reading and mathematics, and well-stocked minds conversant with individual subject matters like history and biology."[383] Hirsch further says:

> We must not accept the claim that knowing how to learn (which is an abstract skill that does not even exist) is more important than having a broad foundation of factual knowledge that really does enable further learning. We must

That much of California's teaching force has been indoctrinated in less effective student-centered teaching methods is likely a significant factor in the low achievement of California students.



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reject the disparagement of verbal learning and the celebration of "hands-on" learning, based on the false Romantic premise that mere words are inauthentic components of human understanding. We cannot afford still to accept the untrue belief that adequate schooling is natural and painless, and mainly a function of individual talent rather than hard work. We must reject the false claim that delaying learning until the child is "ready" will speed up learning in the long run. We must cease listening to the siren call that learning should be motivated entirely by inward love of the subject matter and interest in it, without a significant admixture of external incentive. In short, we must cease attending to the Romantic ideas that the reformers of the 1990s, echoing the reformers of the 1920s, '30s, and '40s and all the decades in between, have been pronouncing in chorus. These ideas are emphatically not reforms. They are the long-dominant controlling ideas of our failed schools.[384]

Student-centered ideology has failed our schools and our children, and that crucial fact must be made widely known to policymakers, parents, and the public.

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What practical steps can be taken? Stone notes that "The pedagogical ideal in which virtually all teachers have been trained has ensured that their aspirations are at odds with both public policy and the public's educational priorities."[385] Similarly, Chall says:

> Most teachers have been convinced by their teacher training, professional organizations, and journals that a progressive approach is best—for a democracy and for the social and emotional well-being of the child, as well as for academic progress. Such teachers will find it difficult to look to the more structured intellectual approaches of a traditional emphasis that has been held so long in low-esteem.[386]

Any teacher who went through a teacher-training program at one of the CSU campuses would likely find it difficult to switch to a structured teacher-centered approach. Nancy Ichinaga can attest to that fact. Difficult or not, however, concrete measures must be adopted that will change the methods used by the teacher corps.

Stone makes an excellent first-step recommendation as to how to better align teacher training with public sentiment and policy. Observing the simple completion of a state-approved teacher-training program and success on state licensure exams merely assures candidate familiarity with student-centered methods, Stone says:

> A better indicator—one more directly aligned with public policy—would be the measured effectiveness of novice teachers in improving the achievement of their K-12 students. Data on the classroom performance of novice

> teachers could be aggregated on a program-by-program basis and made available to the public. Over time, teacher-training programs producing effective teachers would attract enrollment, and those with less effective graduates would tend to lose enrollment. The quality problem would become an enrollment problem and college presidents would be able to effectively address it.[387]

In California, results of the statewide Stanford-9 test are publicly reported only on a school-by-school basis. Results are not reported by classroom, so it impossible to determine the impact of individual teachers on student achievement. This policy should be changed so that test results are reported publicly on a classroom-by-classroom basis. Such a change would allow for alternatives in addition to Stone's enrollment-based solution. For example, sanctions, such as loss of tenure and no pay increases, and rewards such as increased pay, could then be attached to the performance of individual teachers. Such a teacher accountability system would have an eventual effect on the teacher training practices of university schools of education. Teachers would demand that their courses teach them to produce results, in the form of improved student achievement, as opposed to unsupported and ineffective dogma. Since failure to produce results would have tangible negative effects on teachers' careers, the demand for more effective teacher training programs would be more difficult for universities to ignore.

An additional step that should be taken is the implementation of teacher-centered, hard knowledge-and-skill curricula in the classroom. Some districts, such as Sacramento City Unified School District, have implemented traditional teacher-centered curricula such as the phonics-based Open Court reading program. Sacramento's test scores have improved sharply across the board, regardless of the ethnic or socioeconomic background of the student test-takers. Jim Sweeney, Sacramento's superintendent, observes that how and what one teaches children are the keys. The kids didn't change, says Sweeney, "We changed what we did in the classroom."[388]

Other districts have turned to the successful teacher-centered Saxon math program to increase student achievement. If all or most California districts implemented such teacher-centered curricula and fully followed the state's tough academic content standards, which emphasize basic knowledge and skills and teacher-centered approaches such as phonics instruction, then there would be immense pressure for the CSU schools of education to change the way they teach prospective teachers. The teachers themselves would demand the change, because without it they would be unprepared for what they had to teach.

Improved government accountability programs, plus rigorous curricula, should also be supplemented with school-choice programs for parents and students. If all parents, or at least parents of children in low-performing schools, were given a state-funded opportunity scholarship that could be used to send their children to private schools, the reverberations would be felt throughout the educational establishment, including the university schools of education. If private schools offering teacher-centered approaches such as Open Court, Saxon, the Singapore math curriculum, or Kumon (the Kumon Company runs a high school in Japan) attracted significant numbers of

parents and their children, then the schools of education would have to change their programs to meet the demand, not only of public-school teachers, who could become unemployed due to a lack of students, but also of parents and the public, who, by and large, favor traditional teacher-centered achievement-oriented practices.

There is currently very little incentive for schools of education to change their biased and doctrinaire programs. If lawmakers tried simply to dictate a change in these programs, however, it would be ineffective and only result in protests by educators against government attacks on academic freedom. Rather than a counterproductive frontal assault, it is better to give university schools of education the incentive to change through tough accountability programs for teachers and school choice for parents and students. Self-interest and self-preservation can be mighty forces of change.

To reiterate, an effective teacher-training reform strategy would have five prongs:

- Public reporting of student test scores by classroom.
- Teacher sanctions and rewards based on classroom test scores.
- District implementation of rigorous teacher-centered curricula that stress basic knowledge and skills.
- Vigorous classroom implementation of California's rigorous academic content standards.
- School-choice scholarships for students, either through a universal or targeted program.

Real accountability that could threaten teacher livelihoods and school choice that could threaten the entire educational establishment may seem like drastic measures. Yet barring such drastic measures, schools of education will remain Augean Stables of instructional methodology. And the costs to students and society will continue to be overwhelming. As Stone and Clements observe, student-centered practices result in lost educational opportunities for students, which may impair their career prospects.[389] Such lost opportunities also cost taxpayers "both in failed human resource development and the cost of remediation."[390] As they conclude, "Schooling that permits students to waste their own time and taxpayer-funded educational opportunity is an enormous but largely overlooked public disservice."[391] It is, therefore, time to shine a strong light on that disservice and be bold in rectifying it.

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92 *Ibid.*
93 *Ibid.*, p. 380.
94 Rosenshine and Stevens say that explicit teaching procedures are most applicable "where the objective is to master a body of knowledge or learn a skill which can be taught in a step-by-step manner." Thus, they say, "these procedures apply to the teaching of facts that students are expected to master so that they can be used with new information in the future." They give examples such as arithmetic facts, decoding procedures, vocabulary, English grammar, the factual parts of science and history, the vocabulary and grammar of foreign languages, and musical notation. Further, they say that these procedures "apply to the teaching of processes or skills that students are expected to apply to new problems or situations." In other words, they apply where "the student is taught a general rule which is then applied to new situations." Examples include mathematical computation, blending sounds in decoding, English grammar, applying scientific laws, and solving algebraic

equations. Rosenshine and Stevens note that their findings are least applicable for teaching in "ill-structured" areas where the skills to be taught do not follow explicit steps or where a general skill is not applied repeatedly. Such "ill-structured" areas include teaching composition and writing of term papers, analysis of literature, and problem solving in specific content areas. *Ibid.*, p. 377. It must be stressed, however, that although the Rosenshine-Stevens model may not be appropriate for certain problem-solving situations, in order to solve problems students must have automatic accessibility to prior lower-order knowledge. Since the Rosenshine-Stevens model ensures this accessibility, it is an essential ingredient in allowing students to engage successfully in problem-solving activities. See *Ibid.*, p. 378.

95 Chall, *op. cit.*, p. 170
96 *Ibid.*, pp. 170–71.
97 *Ibid.*, p. 171.
98 *Ibid.*, p. 58.
99 *Ibid.*
100 *Ibid.*, p. 60.
101 *Ibid.*, p. 71.
102 *Ibid.*, p. 125.
103 California Department of Education, *op. cit.*, p. 11.
104 Rebecca Herman, "Approaches to Schoolwide Reform: Taking a Critical Look," American Institutes for Research, 1999.
105 *Ibid.*
106 *Ibid.*
107 G.L. Adams and Siegfried Engelman, *Research on direct instruction: 25 years beyond Distar* (Seattle, WA: Educational Achievement Systems, 1996).
108 *Ibid.*
109 Bonnie Grossen, "What is Wrong with American Education," in *What's Gone Wrong in America's Classrooms*, Williamson M. Evers, ed. (Stanford, CA: Hoover Institution Press, 1998): p. 27.
110 Stone, *op. cit.*
111 Bonnie Grossen, *op. cit.*, p. 28.
112 Stone, *op. cit.*
113 Herbert J. Walberg, "Uncompetititve American Schools: Causes and Cures," in *Education Policy 1998*, Diane Ravitch, ed. (Washington, DC: Brookings Institution Press, 1998): pp. 185–88.
114 *Ibid.*, p. 188. Mastery learning requires frequent tests of subject matter to ensure that students master one unit before going on to the next. Computer-assisted instruction uses computers as learning tools, incorporates mastery principles, and requires careful analysis of subject matter and quick diagnosis and correction of learner errors.
115 Herman, *op. cit.*
116 Grossen, *op. cit.*, p. 28.
117 Rosenshine and Stevens, *op. cit.*, p. 365.
118 *Ibid.*
119 Chall, *op. cit.*, p. 149.
120 *Ibid.*
121 Loveless, *op. cit.*, p. 286.
122 Hirsch, *op. cit.*, p. 250.
123 Anderson, *et al.*, *op. cit.*, p. 240.
124 *Ibid.*, p. 241.
125 Brophy and Good, *op. cit.*, p. 341, describing findings summarized in J. Brophy and C. Everston, *Learning from Teaching: A Developmental Perspective* (Boston, MA: Allyn & Bacon, 1976).
126 *Ibid.*
127 Anderson, *et al.*, *op. cit.*, p. 241.
128 *Ibid.*
129 *Ibid.*, p. 248 citing R. Case and S. Griffin, "Child Cognitive Development: The Role of Control Conceptual Structures in the Development of Scientific Thought," in *Developmental Psychology: Cognitive, Perception-Motor, and Neurophysiological Perspectives* (North Holland, 1990).
130 K. Anders Ericsson, *op. cit.*, p. 262.
131 Anderson, *et al.*, *op. cit.*, p. 244.
132 *Ibid.*
133 Hirsch, *op. cit.*, pp. 246–47.
134 Adams and Hamm, *op. cit.*, p. 51.
135 Stone and Clements, *op. cit.* Regarding studies which show student achievement gains under cooperative learning, Stone and Clements cite research contained in Robert E. Slavin, *Cooperative Learning: Theory, Research, and Practice*, 2nd ed. (Needham Heights, MA: Allyn & Bacon, 1995). It should be noted, though, that Slavin is criticized by Anderson, Reder, and Simon for treating cooperative learning as an academic panacea and for not addressing the problems associated with the method. See Anderson, *et al.*, *op. cit.*, pp. 244, 273.
136 *Ibid.*
137 Anderson, *et al.*, *op. cit.*, p. 244.
138 Hirsch, *op. cit.*, p. 247.
139 J.E. Stone, correspondence with the author, November 14, 2000.
140 Harold Wenglinsky, "How Teaching Matters," Educational Testing Service and the Milken Family Foundation, October 2000: p. 30.
141 J.E. Stone, correspondence with the author, November 14, 2000.
142 *Ibid.*
143 *Ibid.*
144 Wenglinsky, *op. cit.*, p. 30.

145 It is amazing, and troubling, that, despite Wenglinsky's own admissions concerning the shortcomings of the methodology used in his study, he still recommends that policymakers "make use of more prescriptive mechanisms to encourage the teaching of higher-order thinking skills and related practices." For example, he recommends that teachers be given financial bonuses for using higher-order-thinking practices in the classroom. Wenglinsky, *op. cit.*, p. 32. Given that Wenglinsky's study fails to prove a causal connection between higher-order-thinking practices and increased student achievement, such recommendations are highly premature and unjustified.
146 Hirsch, *op. cit.*, p. 242.
147 *Ibid.*, p. 216.
148 Stone and Clements, *op. cit.*
149 *Ibid.*
150 *Ibid.*
151 "Conceptual Framework," School of Education, California State University Dominguez Hills, available at www.csudh.edu/soe/conframe.htm.
152 *Ibid.*
153 *Ibid.*
154 Paulo Freire, *Pedagogy of the Oppressed* (New York, NY: Continuum Publishing, 1998): p. 53.
155 *Ibid.*, p. 54.
156 *Ibid.*, p. 58.
157 *Ibid.*, p. 54.
158 *Ibid.*, p. 57.
159 *Ibid.*, p. 56.
160 *Ibid.*
161 *Ibid.*, p. 60.
162 *Ibid.*, p. 61.
163 *Ibid.*, pp. 61, 64.
164 "Charter School of Education Knowledge Bases for Professional Education Program/Area: Master of Arts Degree in Education Option Middle and Secondary Curriculum and Instruction," California State University Los Angeles, program documents, 1997. Copy available from Pacific Research Institute for Public Policy.
165 *Ibid.*
166 *Ibid.*
167 Hirsch, *op. cit.*, p. 135.
168 "Charter School of Education Knowledge Bases for Professional Education Program/Area: Master of Arts Degree in Education Option Middle and Secondary Curriculum and Instruction," *op. cit.*
169 *Ibid.*
170 "Institutional Report for Continuing Accreditation by the California Commission on Teacher Credentialing and the National Council for Accreditation of Teacher Education," San Jose State University College of Education, February 1998, pp. 5–6.
171 *Ibid.*, p. 6.
172 *Ibid.*, p. 7.
173 *Ibid.*
174 *Ibid.*
175 "A Proposal for Approval of a Multiple Subject Internship Credential Program with a Cross-Cultural Language and Academic Development Emphasis Program," San Diego State University College of Education, November 30, 1995, p. 2.
176 *Ibid.*, p. 32.
177 *Ibid.*
178 "Single Subject Credential and Middle Level Emphasis SFSU-Elk Grove Intern Program," San Francisco State University College of Education, March 25-29, 2000: p. 12.
179 *Ibid.*
180 *Ibid.*, pp. 12–13.
181 *Ibid.*, p. 20.
182 *Ibid.*
183 *Ibid.*, p. 24.
184 Harvey Daniels and Marilyn Bizar, *Methods that Matter* (York, ME: Stenhouse Publishers, 1998): p. 4.
185 *Ibid.*, p. 2.
186 *Ibid.*, pp. 3-4.
187 Hirsch, *op. cit.*, p. 173.
188 J.E. Stone, "Aligning Teacher Training with Public Policy," *The State Education Standard*, 1(1), pp. 35–38, available at http://education-consumers/aligning-training.htm.
189 Daniels and Bizar, *op. cit.*, p. 20.
190 *Ibid.*, p. 21.
191 *Ibid.*, p. 29.
192 *Ibid.*
193 *Ibid.*, p. 30.
194 Hirsch, *op. cit.*, p. 218.
195 Daniels and Bizar, *op. cit.*, p. 59.
196 *Ibid.*, p. 60.
197 *Ibid.*, p. 130.
198 *Ibid.*
199 *Ibid.*, p. 131.
200 *Ibid.*, p. 134.
201 *Ibid.*, p. 203.
202 *Ibid.*, p. 205.
203 *Ibid.*
204 *Ibid.*
205 *Ibid.*, p. 206.
206 For a full discussion of the pros and cons of various assessment methods, plus the observations of Susan Phillips, see Lance T. Izumi, "Developing and Implementing Academic Standards," Pacific Research Institute for Public Policy, January 1999: pp. 31–41.

207 Hirsch, *op. cit.*, p. 229.
208 Daniels and Bizar, *op. cit.*, p. 206.
209 *Beyond the Silence*, J. Cynthia McDermott, ed., (Portsmouth, NH: Heinemann, 1999): p. 1.
210 *Ibid.*, p. 2.
211 Hirsch, *op. cit.*, p. 271.
212 McDermott, *op. cit.*, p. 3.
213 *Ibid.*
214 Alfie Kohn, "Offering Challenges, Creating Cognitive Dissonance," in *Beyond the Silence*, J. Cynthia McDermott, ed., *Ibid.*, p. 10.
215 *Ibid.*, p. 11.
216 J. Cameron and W.D. Pierce, "Reinforcement, Reward, and Intrinsic Motivation: A Meta-Analysis," Review of Educational Research, 64(3): pp. 363–423, as cited in J.E. Stone, "Developmentalism: An Obscure but Pervasive Restriction on Educational Improvement," Educational Policy Analysis Archives, vol. 4, no. 8, April 21, 1996, available at http://olam.ed.asu.edu/epaa/v4n8.html. Specifically referring to Kohn's past claims regarding the supposed negative effect of extrinsic motivation, Stone points out that: "Positive reinforcement and other extrinsic sources of motivation have been successfully employed by school psychologists, special educators, and teachers of remedial and 'at-risk' students for many years. Apparently that evidence has been overlooked or discounted."
217 Kohn, *op. cit.*, p. 9.
218 *Ibid.*, p. 7.
219 Jessica Fairbanks, "Giving Up Control," in McDermott, *op. cit.*, p. 20.
220 *Ibid.*, p. 21.
221 Kate Thomas, "The Elusive Project," in McDermott, *op. cit.*, p. 41.
222 Terry O'Connor, "The Rhythms and Routines of Democratic Classrooms," in McDermott, *op. cit.*, p. 46.
223 J. Cynthia McDermott, "Self-Evaluation: Grading So It Really Matters," in McDermott, *op. cit.*, p. 100.
224 *Ibid.*, p. 103.
225 Peter McLaren, "Teachers Committed to the Struggle for Democracy: Cuesta lo que Cuesta," in McDermott, *op. cit.*, p. 135.
226 *Ibid.*, p. 136.
227 *Ibid.*, p. 137.
228 *Ibid.*
229 *Ibid.*
230 *Ibid.*
231 Abruscato, *op. cit.*, pp. 73–88.
232 *Ibid.*, pp. 89-110.
233 *Ibid.*, p. 100.
234 *Ibid.*
235 *Ibid.*, p. 113.
236 Ed Labinowicz, *The Piaget Primer* (Menlo Park, CA: Addison-Wesley, 1980): p. 268.
237 *Ibid.*, p. 154.
238 *Ibid.*
239 *Ibid.*
240 *Ibid.*
241 *Ibid.*
242 *Ibid.*
243 *Ibid.*
244 *Ibid.*
245 *Ibid.*
246 Stone and Clements, *op. cit.*
247 *Ibid.*
248 Labinowicz, *op. cit.*, p. 267.
249 *Ibid.*
250 *Ibid.*, pp. 234, 267.
251 *Ibid.*, p. 267.
252 *Ibid.*, p. 269.
253 *Ibid.*
254 *Ibid.*
255 *Ibid.*
256 *Ibid.*
257 *Ibid.*, p. 277.
258 *Ibid.*
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260 *Ibid.*
261 *Ibid.*, p. x.
262 *Ibid.*, p. xi.
263 Enid Lee, "Anti-Racist Education: Pulling Together to Close the Gaps," in Lee, *et al.*, *op. cit.*, p. 27.
264 *Ibid.*
265 *Ibid.*, p. 4.
266 *Ibid.*
267 *Ibid.*, p. 5.
268 *Ibid.*, p. 6.
269 Enid Lee, "Spelling and Social Justice," in Lee, *et al.*, *op. cit.*, p. 171.
270 *Ibid.*
271 Stone and Clements, *op. cit.*
272 Christine Sleeter, "Teaching Whites About Racism," in Lee, *et al.*, *op. cit.*, p. 44.
273 National Council of Teachers of Mathematics, "Curriculum and Evaluation Standards for School Mathematics: Executive Summary," March 1989: p. 5, in Marilyn Burns, *About Teaching Mathematics* (Sausalito, CA: Math Solutions Publications, 1992): p. 3.
274 Burns, *Ibid.*, p. 7.
275 *Ibid.*

276 *Ibid.*
277 *Ibid.*, p. 10.
278 *Ibid.*, pp. 12–13.
279 *Ibid.*, pp. 15–16.
280 *Ibid.*, p. 26.
281 *Ibid.*, p. 23.
282 Tom Loveless and Paul Diperna, "How Well Are American Students Learning?," The Brookings Institution, September 2000: p. 31. Loveless and Diperna note that while previous research supported calculator use in the classroom, the methodologies used in that research were questionable. Further, they note that little of that research was directed at measuring the impact of calculator use on young children's acquisition of basic skills.
283 Burns, *op. cit.*, p. 22.
284 *Ibid.*
285 *Ibid.*, p. 29.
286 *Ibid.*, pp. 29–30.
287 *Ibid.*, p. 30.
288 *Ibid.*, p. 32.
289 Chall, *op. cit.*, p. 43.
290 Rosenshine and Stevens, *op. cit.*, p. 379.
291 *Ibid.*, p. 378.
292 Hirsch, *op. cit.*, pp. 221–22.
293 David Geary, *Children's Mathematical Development: Research and Applications* (Washington, DC: American Psychological Association, 1994), as cited in Hirsch, *Ibid.*, p. 151.
294 Hirsch, *Ibid.*
295 Burns, *op. cit.*, p. 30.
296 Adams and Hamm, *op. cit.*, pp. 5–6. It is important to note that teachers' knowledge of the content of the subjects they teach is a key ingredient in student achievement. Using longitudinal data, Goldhaber and Brewer found that math and science teachers who majored in those subjects produced higher achieving students. They concluded that in math and science, "it is the teacher-subject-specific knowledge that is the important factor in determining tenth-grade achievement." Dan D. Goldhaber and Dominic J. Brewer, "Evaluating the Effect of Teacher Degree Level on Educational Performance," *Developments in School Finance*, 1996. In a 1999 study, Goldhaber and Brewer found that math students who have teachers with bachelor's or master's degrees in mathematics outperform students whose teachers do not hold those degrees. Dan D. Goldhaber and Dominic J. Brewer, "Teacher Licensing and Student Achievement," in *Better Teachers, Better Schools*, Marci Kanstoroom and Chester E. Finn, Jr., eds. (Washington, DC: Thomas B. Fordham Foundation, July 1999): p. 134.
297 *Ibid.*, p. 6.
298 *Ibid.*, pp. 182–83.
299 Manning, Manning, and Long, *op. cit.*, pp. 71–83.
300 Hirsch, *op. cit.*, p. 270.
301 Gail Tomkins, *Literature for the 21st Century* (New Jersey: Merrill/Prentice-Hall, 2001): p. vi.
302 Donald Orlich, Robert Harder, Richard Callahan, and Harry Gibson, *Teaching Strategies: A Guide to Better Instruction*, 6th edition (Boston: Houghton Mifflin, 2001).
303 Johanna K. Lemlech, *Curriculum and Instructional Methods for the Elementary and Middle School*, 4th edition (Upper Saddle River, NJ: Merrill, 1994): preface.
304 George W. Maxim, *Social Studies and the Elementary School Child*, 6th ed. (Upper Saddle River, NJ: Merrill, 1999): p. iv.
305 *Ibid.*, p. 54.
306 *Ibid.*, p. 55.
307 *Ibid.*
308 George A. Miller as quoted in Hirsch, *op. cit.*, p. 105.
309 Hirsch, *Ibid.*, p. 106.
310 Maxim, *op. cit.*, p. 119.
311 *Ibid.*
312 *Ibid.*
313 *Ibid.*, p. 120.
314 Stone and Clements, *op. cit.*
315 *Ibid.*
316 *Ibid.*
317 *Ibid.*, citing R.K. Hambleton and E. Murphy, "A Psychometric Perspective on Authentic Assessment," *Applied Measurement in Education*, 5: p. 10.
318 *Ibid.*
319 Maxim, *op. cit.*, p. 189.
320 *Ibid.*
321 *Ibid.*, p. 233.
322 *Ibid.*, p. 273.
323 *Ibid.*, p. 274.
324 Program documents prepared for the California Commission on Teacher Credentialing, Sonoma State University, January 1998.
325 *Ibid.*
326 *Ibid.*
327 *Ibid.*
328 *Ibid.*
329 *Ibid.*
330 *Ibid.*
331 *Ibid.*
332 Chall, *op. cit.*, p. 58.
333 *Ibid.*, p. 62. Also, Stone and Clements note that while there is little empirical support for whole-language methods, "By contrast, there is a wealth of experimental research demonstrating the value of reading instruction using artificially taught decoding skills (i.e., phonics)."

They go on to say that "The accumulated evidence seems clear as to which methodology is best suited to producing the educational outcomes wanted by parents and policy makers." See Stone and Clements, *op. cit.* Chief among the experimental studies cited by Stone and Clements is B.R. Foorman, "Exploring Connections Among Reading, Spelling, and Phonemic Segmentation During First Grade," *Reading and Writing: An Interdisciplinary Journal*, 6: p. 65–91.

334 Constance Weaver, *Reading Process and Practice* (Portsmouth, NH: Heinemann, 1994): p. 297.

335 *Ibid.*, pp. 296–97.

336 *Ibid.*, p. 298.

337 Arthur Heilman, *Phonics in Proper Perspective* (Upper Saddle River, NJ: Merrill, 1998): p. 20.

338 *Ibid.*, p. 21.

339 Marion A. Hull and Barbara J. Fox, *Phonics for the Teaching of Reading* (Upper Saddle River, NJ: Prentice-Hall, 1998).

340 See Ina V.S. Mullis, "Comment" in *Brookings Papers on Education Policy 1998*, Diane Ravitch, ed. (Washington, DC: Brookings Institution Press, 1998): pp. 85–104.

341 "Pursuing Excellence: Comparisons of International Eighth-Grade Mathematics and Science Achievement from a U.S. Perspective," National Center for Education Statistics, December 2000: p. 13.

342 Curriculum Development Institute of Singapore, *Primary Mathematics 1A Teacher's Guide*, 3rd ed. (Singapore: Federal Publications (S) PTE LTD, 1994): p. 31.

343 *Ibid.*, p. 52.

344 *Ibid.*, p. 76.

345 *Ibid.*, p. 77.

346 Curriculum Development Institute of Singapore, *Primary Mathematics 5A Teacher's Guide*, 3rd ed. (Singapore: Federal Publications (S) PTE LTD, 1999): p. 122.

347 *Ibid.*

348 Curriculum Development Institute of Singapore, *Primary Mathematics 5B Teacher's Guide*, 3rd ed. (Singapore: Federal Publications (S) PTE LTD, 1999): p. 3.

349 *Ibid.*

350 Curriculum Development Institute of Singapore, *Primary Mathematics 2A Teacher's Guide*, 3rd ed. (Singapore: Federal Publications (S) PTE LTD, 1995): p. 90.

351 *Ibid.*

352 *Ibid.*

353 *Ibid.*, p. 99.

354 Curriculum Development Institute of Singapore, *Primary Mathematics 3B Teacher's Guide*, 3rd ed. (Singapore: Federal Publications (S) PTE LTD, 1999): p. 2.

355 Curriculum Development Institute of Singapore, *Primary Mathematics 4A Teacher's Guide*, 3rd ed. (Singapore: Federal Publications (S) PTE LTD, 2000): p. 37. It should also be noted that because Singapore puts a premium on quickness, accuracy, and mental calculations, the teacher guides do not recommend that students give written reasons for their calculations. Thus, the fifth-grade teacher's guide instructs teachers: "Do not insist that the pupils write down the reason for each step of the calculation for finding an unknown angle." Students are to be encouraged to give their reasons during oral discussion. See Curriculum Development Institute of Singapore, *Primary Mathematics 5B Teacher's Guide*, 3rd ed., *op. cit.*, p. 72.

356 Curriculum Development Institute of Singapore, *Primary Mathematics 4A Teacher's Guide*, 3rd ed., *op. cit.*, p. 28.

357 Curriculum Development Institute of Singapore, *Primary Mathematics 3B Teacher's Guide*, 3rd ed., *op. cit.*, pp. 100–07.

358 Curriculum Development Institute of Singapore, *Primary Mathematics 6A Teacher's Guide*, 3rd ed. (Singapore: Federal Publications (S) PTE LTD, 2000): p. 50.

359 Curriculum Development Institute of Singapore, *Primary Mathematics 4B Teacher's Guide*, 3rd ed. (Singapore: Federal Publications (S) PTE LTD, 2000): p. 16.

360 *Ibid.*, p. 15.

361 *Ibid.*, p. 38.

362 Curriculum Development Institute of Singapore, *Primary Mathematics 5A Teacher's Guide*, 3rd ed., *op. cit.*, p. 57.

363 Curriculum Development Institute of Singapore, *Primary Mathematics 6A Teacher's Guide*, 3rd ed., op. cit,, p. 62.

364 *Ibid.*, p. 50.

365 The authors would like to thank Madge Goldman, president of the Rosenbaum Foundation, for her assistance in the preparation of this section on the Singapore math curriculum.

366 As of March 2000, 1.48 million students in Japan were attending Kumon classes, while 1.18 million students in other countries around the globe were taking the classes. It has often been mentioned in the academic literature that the high achievement of Japanese students is the result not just of what takes place in the Japanese public-school classroom, but also of the added drill-and-practice juku afterschool programs which many Japanese students attend. The Kumon classes are one of the most popular juku programs in Japan.

367 The Kumon website is located at www.kumon.com.

368 *Ibid.*

369 *Ibid.*

370 *Ibid.*

371 Nancy Ichinaga, interview with the authors, May 23, 2000.

372 *Ibid.*

373 *Ibid.*
374 *Ibid.*
375 *Ibid.*
376 Lorraine Fong, interview with the authors, May 23, 2000.
377 Nancy Ichinaga, *op. cit.*
378 *Ibid.*
379 *Ibid.*
380 *Ibid.*
381 *Ibid.*
382 William L. Sanders and June C. Rivers, "Cumulative and Residual Effects of Teachers on Future Student Academic Achievement," (Available from UTVARC, 225 Morgan Hall, P.O. Box 1071, Knoxville, TN 37901-1071), 1996: p. 9.
383 Hirsch, *op. cit.*, p. 236.
384 *Ibid.*, pp. 236–37.
385 Stone, *op. cit.*
386 Chall, *op. cit.*, p. 178.
387 Stone, *op. cit.*
388 "City schools improve in statewide reading, math tests," *Sacramento Bee*, June 25, 1999: p. A20.
389 Stone and Clements, *op. cit.*
390 *Ibid.*
391 *Ibid.*

# About the Authors

**LANCE T. IZUMI** is senior fellow in California Studies and director of the Center for School Reform at the Pacific Research Institute (PRI). He is the author of several major PRI studies, including the *California Index of Leading Education Indicators* (1997 and 2000 editions) and *Developing and Implementing Academic Standards* (1999). He currently serves as a member of the California Postsecondary Education Commission and is a member of the Professional Development Working Group of the California Legislature's Joint Committee to Develop a Master Plan for K–12 Education. He is a former visiting fellow in education studies at the London-based Institute of Economic Affairs.

Mr. Izumi has also served as a consultant on welfare reform to the California Department of Social Services, a consultant on juvenile crime to the Governor's Office of Criminal Justice Planning, and as co-chair of the governor's competitiveness task force on juvenile justice education reform. His articles have been published in the *Notre Dame Journal of Law, Ethics and Public Policy*, *Harvard Asian American Policy Review*, *National Review*, *Wall Street Journal Europe*, *Sunday Times* (of London), *Los Angeles Times*, *San Francisco Chronicle*, *Investor's Business Daily*, *California Journal*, *Los Angeles Daily News*, *San Diego Union-Tribune*, *Orange County Register*, *Sacramento Bee*, and many other publications. Mr. Izumi is a regular contributor to the "Perspectives" opinion series on KQED-FM, the National Public Radio affiliate in San Francisco.

**K. GWYNNE COBURN** is a public policy fellow in Pacific Research Institute's Center for School Reform. Ms. Coburn co-authored the PRI publication *Failing Grade: Crisis and Reform in the Oakland Unified School District* and was the primary researcher for the *California Index of Leading Education Indicators, 2000*. Her editorials on education reform have appeared in newspapers throughout the state.

Based in Sacramento, Ms. Coburn also serves as a liaison to the California legislature. A graduate of the University of California at San Diego, Ms. Coburn previously served as Assistant Deputy Cabinet Secretary in the administration of California Governor Pete Wilson.

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# Facing the Classroom Challenge

## Teacher Quality and Teacher Training in California's Schools of Education

By
Lance T. Izumi
with K. Gwynne Coburn

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755 Sansome Street, #450
San Francisco, CA 94111
Phone: 415/989-0833
Fax: 415/989-2411
E-mail: pripp@pacificresearch.org

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